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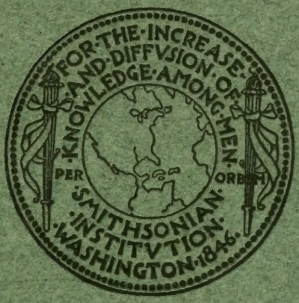
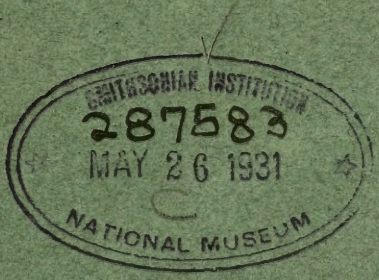
THE RUINS AT KIATUTHLANNA EASTERN ARIZONA

BY
FRANK H. H. ROBERTS, Jr.





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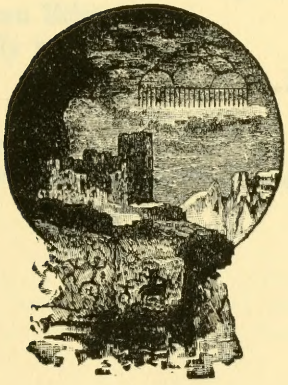

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LETTER OF TRANSMITTAL

SMITHSONIAN INSTITUTION,
BUREAU OF AMERICAN ETHNOLOGY,
Washington, D. C., September 10, 1930.

SIR: I have the honor to transmit the accompanying manuscript, entitled "The Ruins at Kiatuthlanna, Eastern Arizona," by Frank H. H. Roberts, jr., and to recommend its publication as a bulletin of the Bureau of American Ethnology.

Very respectfully yours,

M. W. STIRLING,
Chief.

DR. CHARLES G. ABBOT,
Secretary of the Smithsonian Institution.

CONTENTS

	Page
Foreword	1
Introduction	2
House remains	15
Pit houses	16
Group No. 1	19
Group No. 2	43
Group No. 3	59
Group No. 4	77
Isolated pit houses	83
Jacal structures	86
The pueblo ruin	90
House type summary and conclusions	109
Minor objects of material culture	113
Pottery	114
Designs on the painted pottery	130
Additional pottery objects	149
Basketry	150
Bonework	150
Stone objects	153
Objects of shell	160
Minor objects, summary and conclusions	163
Human burials	168
General summary and conclusions	171
Appendix	177
Table 1. Room measurements in the pueblo ruin	177
Table 2. Size and provenience of objects illustrated in text figures	178
Table 3. Size and provenience of objects illustrated in plates	179
Bibliography	183
Index	187

ILLUSTRATIONS

PLATES

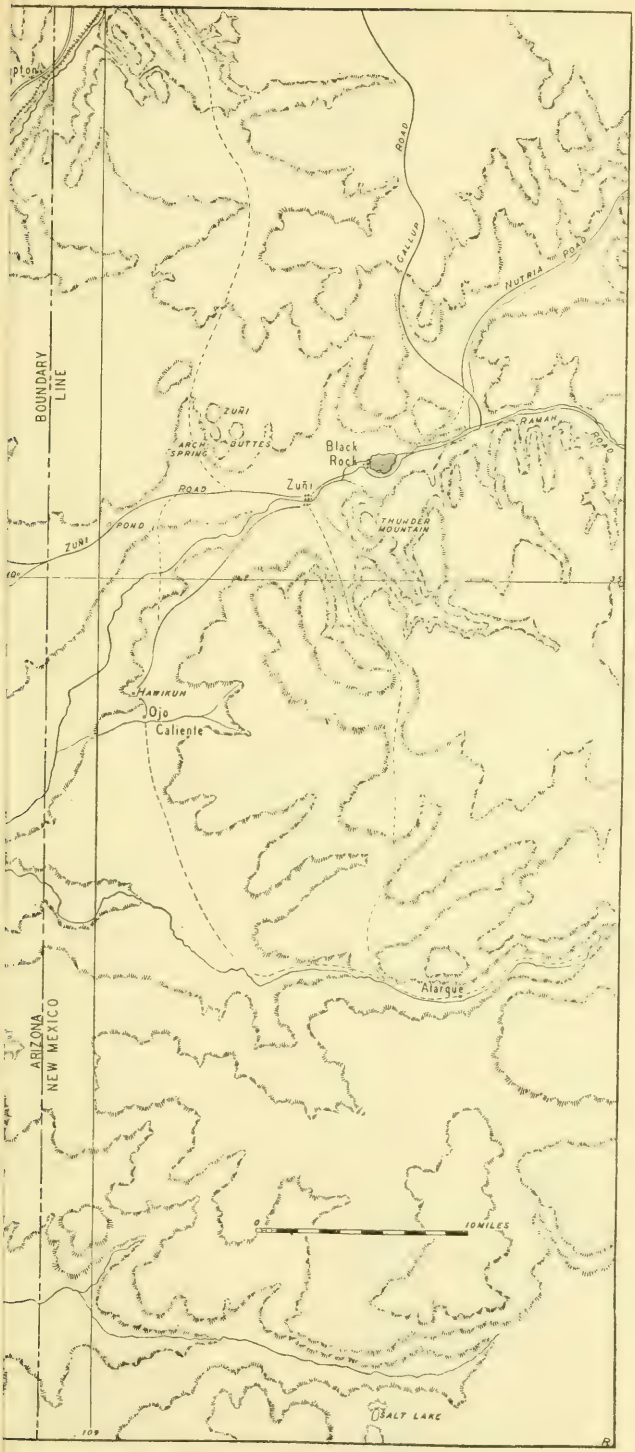
		Page
1.	Map of region showing location of the Long H Ranch, Kiatuthlanna, and ruins excavated	VIII
2.	Scenes in vicinity of ruins. *a*, View of region to the south. *b*, One of the petrified logs. *c*, The Red Lake. *d*, The Green Lake	6
3.	The Group 1 house cluster. *a*, Looking across B toward C and D. *b*, House D in foreground, C and B in rear. *c*, House A, Group 1	6
4.	House remains. *a*, House B, Group 1. *b*, House C, Group 1. *c*, House D, Group 1	32
5.	House remains. *a*, House B, Group 2. *b*, House C, Group 2. *c*, House B, Group 3	32
6.	Pit houses. *a*, House D, Group 3. *b*, House E, Group 3. *c*, House B, Group 4	78
7.	Details in pueblo. *a*, Pit dwelling beneath walls of ruin. *b*, Ventilator side of kiva B	78
8.	Constructional features in pueblo. *a*, Fire pit and trench in floor of kiva B. *b*, Ventilator recess in kiva C. *c*, Wall built on débris of accumulation	100
9.	Walls in pueblo ruin. *a*, Foundations on débris in room 6. *b*, Bottom of stone wall resting on fill in kiva A. *c*, Example of masonry construction	100
10.	Pueblo views. *a*, Row of rooms with connecting doorways. *b*, Bench and one of pilasters in kiva D. *c*, Ventilator and recess, kiva D	106
11.	Culinary vessels from the pit houses	106
12.	Corrugated culinary jars from the pueblo	126
13.	Black-on-white seed jars and canteen from the pit houses	126
14.	Pitchers and canteen, black-on-white wares, from the pueblo	126
15.	Pitchers from the pit houses	126
16.	Black-on-red ware vessels from the pueblo	130
17.	Bowls from the pit houses	130
18.	Ladles of black-on-white group from pit houses	130
19.	Pit-house bowls with quartered plan of decoration	130
20.	Black-on-white bowl designs, pit-house vessels	134
21.	Decorations on black-on-white bowls from the pit dwellings	134
22.	Black-on-white bowls from the pit houses	134
23.	Bowl interior. *a* to *d*, pit houses. *e* to *h*, from the pueblo	134
24.	Pottery smoothers made from vessel fragments	152
25.	Bone awls, characteristic pit-house form	152
26.	Awls made from fortuitous splinters, pit-house implements	152
27.	Pit-house tools showing only slight modification of the original bone	152
28.	Slender awls and bodkins from the pit dwellings	152
29.	Bone awls and spatulate implement from the pueblo	152
30.	Pueblo awls made from fortuitous splinters	152

Page

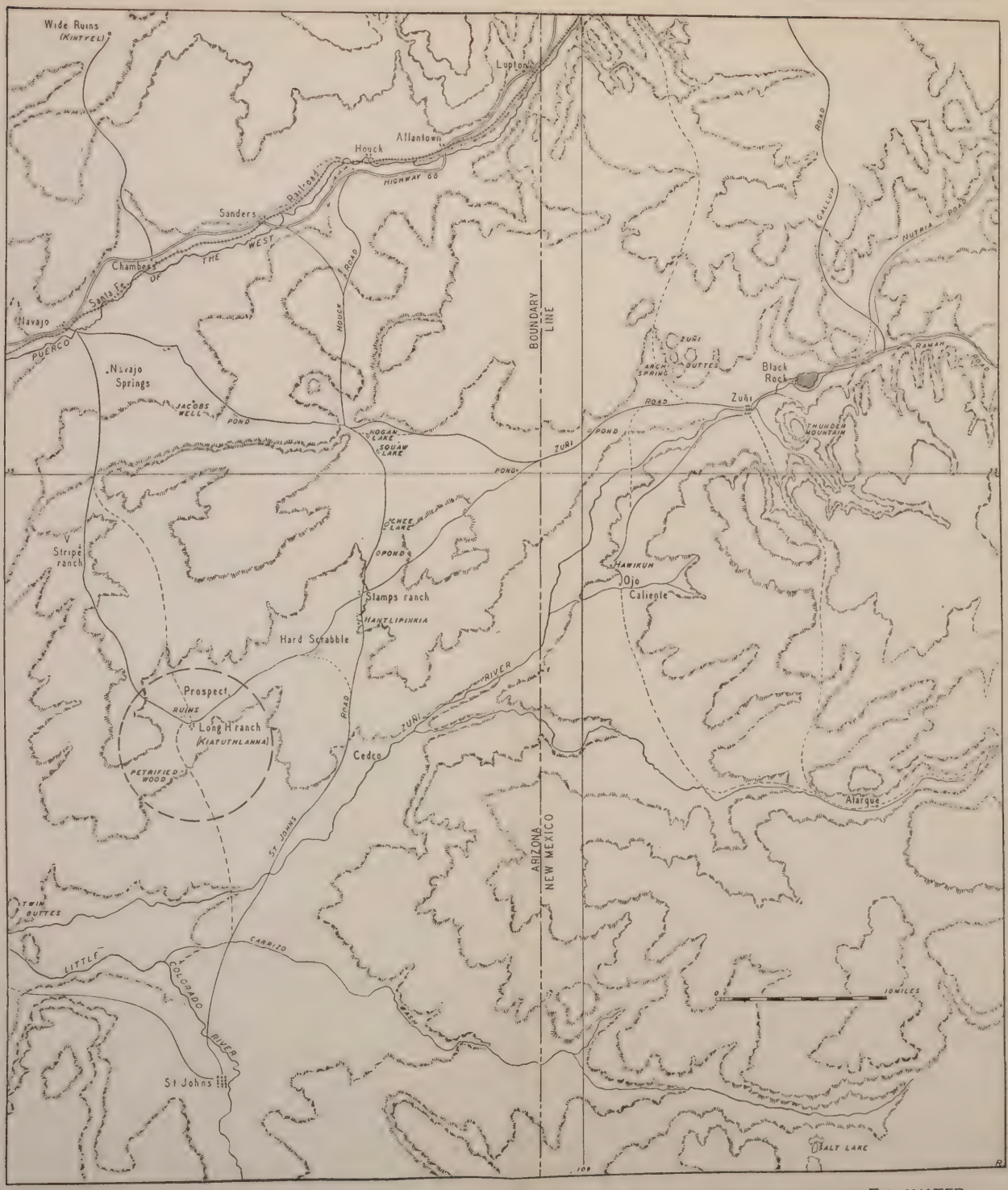
31. Bone scrapers from the pueblo 152
32. Typical milling stone 158
33. Stone axheads and mauls 158
34. Stone bowls 158
35. Miscellaneous objects of stone 158
36. Drills and knife blades from the pit houses 158
37. Knife blades and scraper from the pueblo 158
38. Pit-house spear points 158
39. Arrowheads 158
40. Stone pipes 158
41. Stone pendants from the pit houses 158
42. Shell pendants from the pit houses 158
43. Shell beads 158
44. Necklace of stone and shell beads 158
45. Necklace of shell beads 158
46. Bracelets of shell 162
47. Characteristic position of interment 162

TEXT FIGURES

1. Plan of central portion of house Group No. 1 22
2. Sections through houses in Group No. 1 27
3. Postulated method of superstructure construction for houses B and C, Group No. 1 28
4. Detail of superstructure construction in houses B and D, Group No. 1 28
5. Plan of house Group No. 2 44
6. Plan of house C, Group No. 2 50
7. Plan of house Group No. 3 60
8. House D, Group No. 3 68
9. House E, Group No. 3 72
10. House B, Group No. 4 79
11. Plan of isolated small pit dwelling 83
12. Plan of complete pueblo ruin 91
13. First unit built in pueblo structure 92
14. Plan of pueblo with second unit added 96
15. Third stage in growth of pueblo 99
16. Fourth stage of pueblo structure 101
17. Final stage in the pueblo building 102
18. Sections through various portions of the pueblo ruin 105
19. Jar shapes in black-on-white wares 124
20. Pitcher shapes, black-on-white wares 126
21. Designs, black-on-white bowls of pit-house group 132
22. Examples of quartered designs from pit houses 134
23. Quartered and halved patterns, pit-house series 135
24. Pendent panel designs in pit-house decorations 137
25. Band designs and spiral pattern on pit-house pottery 140
26. Band designs on pit-house bowls 141
27. Bowl decorations showing figures in bottoms of vessels, pit-house wares 142
28. Designs on ladles from the pit-house horizon 143
29. Bowl decorations from the pueblo series 146
30. Styles of pitcher ornamentation in pueblo horizon 148
31. Carved shell armlet 162



G H RANCH, KIATUTHLANNA, AND RUINS EXCAVATED



MAP OF THE REGION SHOWING LOCATION OF THE LONG H RANCH, KIATUTHLANNA, AND RUINS EXCAVATED

THE RUINS AT KIATUTHLANNA, EASTERN ARIZONA

By Frank H. H. Roberts, Jr.

FOREWORD

The archeological investigations which furnished the data for the following report were conducted during the months from May to September, 1929, on the old Long H Ranch at the Twin Salt Lakes in Apache County, eastern Arizona. The ranch properties at the present time belong to the bondholders of the Tucker Livestock Co. Through the courtesy of Mr. B. C. McCabe, of Los Angeles, Calif., one of the principal bondholders, and Mr. Art Saunders, of Holbrook, Ariz., trustee, permission was obtained to carry on the work. The writer is especially indebted to Mr. Saunders for his kindness in allowing the expedition to make its headquarters in the ranch buildings. He is also grateful to him for information on the early history of the ranch and that section of Arizona.

Mr. Jean Allard Jeancon, formerly a special archeologist for the Bureau of American Ethnology, assisted the writer during the months of June, July, and August. Linda B. Roberts kept the field catalogue of specimens, aided in the repair of pottery and other objects obtained from the excavations, and assisted in the preparation of text figures illustrating pottery designs. Twelve Zuñi Indians were used as laborers. They not only performed their routine duties in a highly satisfactory manner but they contributed ethnological material through their songs and dances. Myths and legends regarding the locality were obtained from several of the boys. These stories were confirmed and elaborated upon by a number of the older men from Zuñi. The latter visited the diggings from time to time as work progressed and were keenly interested in all that was uncovered.

The name Kiatuthlanna is the Zuñi designation for the locality and for that reason has been retained. It means the "Place of the Big Water." The Zuñi relate that it was one of the points where their ancestors tarried and built during the migration which led them from the scene of their origin to the site of the present village in western New Mexico.

INTRODUCTION

Archeological work in the Southwest during the last 25 years has done much to retrieve the story of the unfolding of the aboriginal prehistoric sedentary cultures of the region. The stages represented by the great communal houses and massive cliff dwellings are now well known. There are certain phases of the earlier horizons, however, which still remain to be investigated and others about which only meager information is available. It was in an effort to obtain additional data on the latter that the excavations at Kiatuthlanna were conducted.

The present status of southwestern archeology was thoroughly reviewed in the introductions to two recent bulletins of the Bureau of American Ethnology.[1] Therefore, a very brief summary will serve the requirements of this report. The area as a whole is a high and arid plateau which slopes away toward the south and west from the Rocky Mountains. About its four main river systems, the San Juan, the Rio Grande, the Little Colorado, and the Gila-Salt, there developed a sedentary, agricultural people who built houses of poles, brush and earth, adobe mud, or stone with adobe mortar. In addition, they wove textiles and made pottery. This house-building, pottery-making culture was not suddenly introduced into the region but grew by degrees from very simple beginnings. Its growth and development are shown by a number of stages through which the people passed in their transition from a nomadic hunting existence to a relatively highly cultured sedentary mode of life. To simplify study of this growth the several culture levels have been grouped under two main headings called Basket Maker and Pueblo. The two main classes have been further separated into several subgroups. The Basket Maker, which is the older, has three and the Pueblo five.

Basket Maker I is the nomadic hunting stage during which the people were thinly distributed over the region. Food consisted of game, wild vegetable products, and such wild fruits as the country afforded. The people probably relied to a large extent on caves for shelter, although they may have erected an occasional flimsy dwelling. The introduction of corn from the Middle American area to the south led to the beginnings of agriculture and the second stage of their culture.

Basket Maker II peoples were at first a semihunting, semiagricultural group. As time went on and their crops became more abundant they became more and more sedentary in their habits. Thus far no traces of their houses have been found and it is probable that at

[1] Roberts, 1929, 1930.

their best the dwellings were of a decidedly perishable nature. These people did, however, build small storage bins in which to keep their surplus corn. These granaries consisted of small pits, dug in the floors of caves and lined with large stone slabs, covered by a domelike superstructure of poles, brush, and mud plaster. These people made excellent baskets, twined and woven bags, sandals, ropes, and robes of fur cloth. Their chief weapons were a short javelin, thrown by means of an atlatl, and an S-shaped club. At about the very end of this stage unfired clay containers made their appearance. These vessels were molded in baskets, and to prevent cracking when the clay dried, a binder of cedar bast was used. It is possible that the idea of making clay vessels came from the centers of higher culture to the south, but it unquestionably had a local development.

Basket Maker III is characterized by a number of changes. Several kinds of corn were grown where in the preceding stage there had been only a single hard, flintlike variety. Beans were added to the food supply and feather robes were occasionally made. There was a slight decline in woven materials and ceramics progressed to a point where fired pottery with painted decorations made its appearance. A dwelling of more or less permanent nature was evolved from the storage bins. The bow and arrow came into use. The end of the era was marked by the arrival of a new group of people. The Basket Makers throughout the course of their development were consistently a long-headed group. The appearance of a different people is recorded through the finding of an occasional skeleton with a round or broad skull. The latter occur only in burials which were made at the very end of the Basket Maker supremacy. This influx of a physically different group marks the beginning of the second great period, that of the Pueblo peoples.

Pueblo I is a horizon which witnessed many changes; it was a time of instability and fluctuation in cultural features. The crude, single-roomed domiciles of semisubterranean character gave way to structures with several contiguous rectangular rooms. Cotton fabrics assumed an important rôle. The wild turkey was domesticated. Pottery was much more extensively made and ceramic characteristics which definitely designate the wares of the period were developed. In addition, the practice of cranial deformation was adopted. All typical Pueblo skulls of the prehistoric periods show a flattening of the occipital region, the back of the head. This was due to the type of cradle board used for the infants. This characteristic appears in the Pueblo I stage. The few round-heads occasionally found in conjunction with Basket Maker III people do not have the deformation.

Pueblo II represents what is called the small house period in the Southwest. It is marked by the widespread distribution of life in small villages. The general type of dwelling was that which has been called the unit or single clan house. Such a structure was one story in height and contained from four to eight, occasionally more, rooms. The latter were placed either in a single long row, a shorter double row, or frequently in an L-shape. The walls were either of stone or adobe, according to the locality, and the roofs were flat. Associated with the house at the south or southeast side was a circular ceremonial chamber, generally subterranean, called the kiva. It was during this stage in the unfolding of the Pueblo cultures that the indented corrugated form of pottery, one which is considered as typical of the area, developed.

Pueblo III is the greatest horizon in the aboriginal history of the Southwest. It was the era of the great urban centers when houses of several hundred rooms were built on canyon floors, in caverns in the cliffs, or on mesa tops. Pottery became so specialized that each center had its own definite forms. These are so characteristic that each vessel tells at once the place of its origin. The closing phase of the period witnessed a marked decline in many of the main centers, a complete abandonment of others, together with a marked southward migration from the northern parts of the area.

Pueblo IV has two phases. The first extends from the end of the III stage, about 1300 A. D., down to the time immediately preceding the arrival of the Spaniards in 1540. It is marked by still further withdrawals from the peripheral districts, a cultural decline and the establishment of new communities in more central portions of the area. The latter part of Pueblo IV, from the arrival of the Spaniards to the end of the reconquest, represents the early historic period. It is characterized by an even greater subsidence from the preceding cultural peak.

Pueblo V is the period of the modern villages and covers the interval from the final subjugation of the Pueblos in 1700 down to the present day. The period shows the gradual breaking down of Pueblo life under the influence of the white man.[2]

On the basis of information obtained by Dr. A. E. Douglass in his study of growth rings in timbers and the respective ages of the beams used in the construction of prehistoric houses, it is possible to give a series of dates for the various periods in the southwestern chronology. Pueblo V dates from 1700 to the present. Pueblo IV, phase b, 1540 to 1700; phase a, 1350 to 1540. Pueblo III, phase b, 1200

[2] Examples of sites representative of the various stages and lists of publications on them are given in Roberts, 1929, 1930. Kidder, 1924, gives a well-rounded discussion of the characteristic features of the various periods.

to 1350; phase a, 900 to 1200.[3] Actual dates are not available for Pueblo II and preceding horizons. Estimates on their extent may be made, however. Pueblo II was the stage in which the stone type of house and other features which were characteristic of later stages were perfected and it is quite logical to suppose that it covered an interval equal to if not longer than Pueblo III. Hence it may be supposed that it had its beginning between 500 and 600 A. D. Pueblo I no doubt required a considerable length of time in which to develop its traits, because it was during this stage that many changes in the older culture were made. New features were developed and the Basket Makers were either replaced or absorbed by the incoming Pueblos. A fair estimate for the duration of Pueblo I would be 500 years. This would make the appearance of the Pueblo peoples occur at about the beginning of the Christian era. The Basket Makers must have come into the region between 1,000 and 1,500 years before the Pueblos.

The Long H Ranch is located at the Twin Salt Lakes, 40 miles (64.374 k.) southwest of the pueblo of Zuñi and 20 miles (32.187 k.) north of the modern town of St. Johns. (Pl. 1.) The region is a rolling mesa country dotted with buttes and an occasional sand dune. It is for the most part grassland, except during periods of drought, when it is an almost barren waste, with scattered cedars and some sagebrush. West of the ranch, and the ruins which were investigated, the terrain rises to the cedar-covered Navajo mesa and on the east and south drops abruptly into Hard Scrabble Wash. (Pl. 2, *a*.) The latter slopes away toward the southwest where it joins the valley of the Zuñi River.

The locality presents several features of interest in addition to those of a purely archeological nature. Three miles (4.828 k.) south of the ranch houses, on the edge of Hard Scrabble Wash, is a large outcropping of petrified wood, probably an eastern extension of the Petrified Forest which lies several miles farther west. Some of the logs, exposed on the surface of the ground, are 50 feet (15.24 m.) long and from 4 to 5 feet (1.22 to 1.53 m.) in diameter. (Pl. 2, *b*.) The stone is brightly colored in many of the specimens and, judging from the fragments found in the ruins and refuse mounds, was extensively collected by the prehistoric settlers. Several small ruins in the immediate vicinity of the outcrop show that the builders even went so far as to use blocks of the petrified wood in erecting walls. This probably may be attributed more properly to a scarcity of suitable building material than to a marked preference for the colored stone.

[3] Douglass, A. E., 1929.

One-half mile (805 meters) from the ruins and adjacent to the ranch buildings are the two small lakes to which the Zuñi attribute special ceremonial significance. One is very salty and distinctly red in color while the other is only slightly saline and has a pronounced green hue. Around the borders of these lakes are a number of fresh-water springs which probably were an important factor in the choice of the location by the people whose house and village remains attract the archeologist. (Pl. 2, *c*, *d*.) As previously stated, the Zuñi name for the locality is Kiatuthlanna, the Place of the Big Water. Old Hustito, one of the rain priests from Zuñi, informed the writer that it was the first spot where the ancients are supposed to have stopped on their journey from the Sacred Lake, at the junction of the Zuñi and Little Colorado Rivers southwest of the Long H, to the place of the middle or present Zuñi. This story was later repeated in detail by Tsa'wehle, an old war priest, upon the occasion of one of his visits to the excavations. In the history myth of the Zuñi as recorded by Mrs. Stevenson the same information is given.[4] She makes no mention, however, of the fact that Kiatuthlanna is associated with a definite geographical place. She apparently never visited the Twin Lakes on any of the journeys which she made to various points sacred to the Zuñi in this vicinity.

There is a legend which the Zuñi relate concerning the two lakes. It is their effort to explain the outstanding characteristics of each. According to the story, it all took place during the time when the ancients were living at Kiatuthlanna. One curious old woman decided to see what was at the bottom of the red lake and accordingly went down to investigate its depths. While there she became frightened at something and in her haste to leave dropped the pouch of salt which she was carrying, and ever since that day the lake has been very salty. The green lake is bordered by large numbers of reeds which are attributed to the carelessness and curiosity of an old man. He wanted very much to know what was in the green lake so went down into its depths and while there lost the bundle of reeds which he was carrying. They immediately took root and ever since the lake has been surrounded by them.

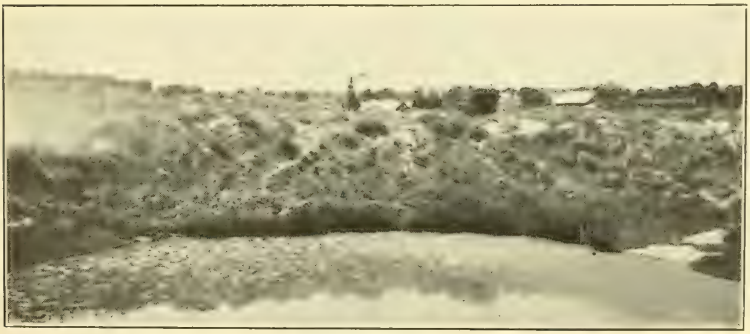
There is probably an additional significance attached to the lakes because at stated intervals during the summer two of the older men employed in the diggings deposited offerings of turquoise in the reeds about the green lake. In addition they sprinkled corn pollen or the sacred meal of the Zuñi on its waters. The writer endeavored to learn the reason for this, but was unable to do so. The only explanation which was forthcoming was that it was a holy place. Pollen was also sprinkled on the red lake and shortly after the

[4] Stevenson, M. C., 1904, p. 85.

a. View of region to the south

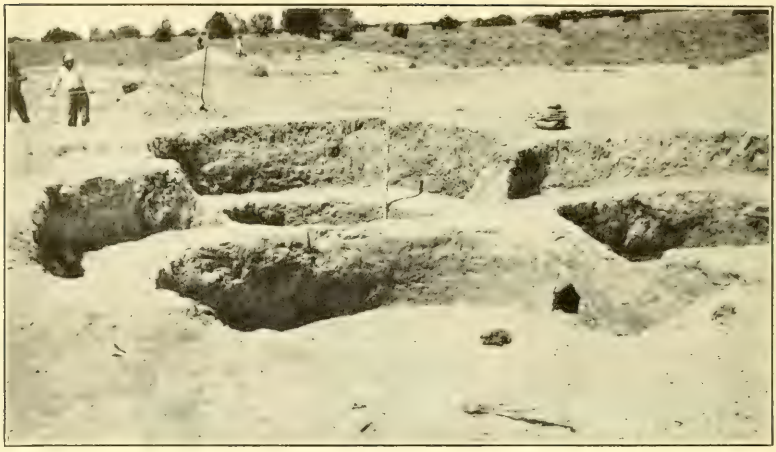
b. One of the petrified logs

c. The Red Lake

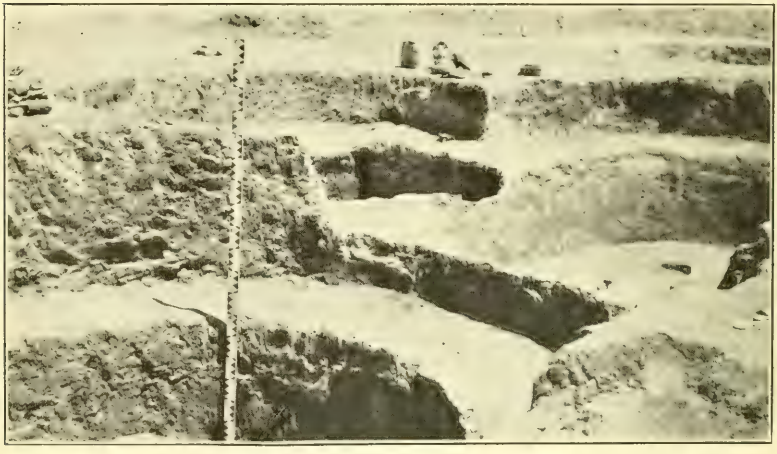


d. The Green Lake

SCENES IN VICINITY OF RUINS



a. Looking across B toward C and D



b. House D in foreground, C and B in rear

c. House A, Group 1

THE GROUP 1 HOUSE CLUSTER

summer solstice in June prayer feathers were placed in the tall grass on its southern bank. The latter act was apparently timed to coincide with ceremonies taking place in the village. Several days prior to the planting of the prayer plumes, the workmen asked if they might send one of their number to Zuñi to find out about a dance. The boy left camp at dawn and returned about noon of the second day following. That evening the men went hunting for birds, and while they were away the camp boy, Charlie Pinto, said that in three days they would put feathers around the red lake. When questioned as to why they should wait that long he replied that the old men in the village had sent word setting the time for the rites.

Every four years, during the ceremonies attendant upon the observance of the summer solstice at Zuñi, a pilgrimage is made to the Sacred Lake. The party of priests leaves Zuñi, passing down through the country, generally making fires on the high points and stopping from time to time to sing chants to the gods in a petition for life-giving rains. The red lake is one of the places which they visit on the pilgrimage. On their arrival they dance around it, singing and scattering corn meal on the water. Their reason for so doing, they explain, is that there is a very large turtle which now lives in the lake. If their ceremonies are properly performed and there is no evil in the hearts of those who bless the water, the turtle will come to the top of the lake and hear their prayers for rain. He will then transmit the supplication to the proper gods. From the red lake the party proceeds to the Sacred Lake, where additional ceremonies are performed. Mrs. Stevenson records the events which take place there but makes no mention of the observances at Kiatuthlanna.[5]

After living at Kiatuthlanna for a period of four years, according to the story told the writer by Tsa'wehle, the ancients again set out in search of the middle of the world. They had not gone far when they came to a valley in the center of which watercress was growing.[6] Here they built a village which was called Pitkiaiakwi or Watercress Place. The old war priest identified the group of ruins located at Hard Scrabble (pl. 1), 8 miles (12.875 k.) northeast from the Twin Lakes, as the remains of ancient Pitkiaiakwi. From Watercress Valley the people once more set out. They came to the place where the diminutive gods of war were created. Here, also, the people were divided into clans on the basis of the groups

[5] Stevenson, M. C., 1904, pp. 153–158.

[6] See account in Mrs. Stevenson, 1904, p. 85. Mrs. Stevenson's location of the spot does not agree with that given here, but the latter is more consistent with the migration myth. See ibid., pp. 232–233.

which had been traveling together. This is a very sacred spot to the Zuñi and is called Hantlipinkia. It is located in a small side canyon 3 miles (4.828 k.) above Hard Scrabble or Pitkiaiakwi. (Pl. 1.) Mrs. Stevenson visited it and has an extensive description of the locality, together with pictures of the clan symbols pecked in the stone of the canyon walls.[7] The writer has not been able to find any report showing the location of Hantlipinkia and for that reason has included mention of it.

Resuming their search for the middle, the Zuñi separated into three groups. They thought that by such a procedure they would be able more quickly to accomplish their mission. One group went south and east, another went directly east, and the third, the Winter People under the leadership of the Sword Swallower Fraternity, the Hlewekwe, went north and east.[8]

Further details of the movements of the first two groups are beyond the requirements of this report. They may be found in both Mrs. Stevenson's and Mr. Cushing's papers on the Zuñi. What befell the Winter People, however, has some connection with features to be discussed in later pages.

The story related by Tsa'wehle follows closely the recorded versions except for one or two statements. He said that the Sword Swallowers went north from Hantlipinkia to the Puerco of the West, turned northeast and followed its course toward the sources, building as they went. This is in keeping with Cushing's account, but Tsa'wehle went further and insisted that the great ruins in the Chaco Canyon, in northwestern New Mexico, were the remains of towns built by the Winter People. From the Chaco, he continued, they went north until they came to a big river (the San Juan), which they crossed. Some distance above it on the banks of a smaller stream which emptied into it they erected a large village. Eventually the people found that it was not the middle place and departed. They followed on up the big river, stopping here and there to build and live for a time, until they came to a large hot spring. They dwelt in this vicinity for a number of years and then crossed over the divide and down a river (the Chama), until they came to the Rio Grande. This they followed toward the south. Finally they turned west again and built at the site of the old Zuñi village of Nutria. From the latter they moved on down the valley to join the other groups and build the village at the spot where the present Zuñi is located.

The interesting part of this story, from an archeological point of view, lies in the fact that the territory covered by the wanderings

[7] Stevenson, M. C., 1904, pp. 34–43.
[8] Stevenson, M. C., 1904, p. 444. Cushing, F. H., 1896, p. 426.

of the Winter People coincides with the range of the so-called Chaco cultures. As will be brought out in following pages, some phases of the remains at Kiatuthlanna show a distinct affiliation with the Chaco forms. The large ruins at Aztec, N. Mex., correspond to the location of the village which was built on a small stream beyond the big river. That the early period at Aztec was distinctly Chacoan has been shown by Mr. Morris.[9]

Northeast along the San Juan are groups of ruins which unquestionably are related to the Chaco cultures. They extend into southern Colorado and are found not far from the famous Pagosa Hot Springs. Crossing from there into northern New Mexico it is possible to trace a whole series of ruins which suggest Chaco influence. Evan as far south and east as Pecos, Chaco traces are to be found in the old black-on-white pottery sites.

From an archeological point of view the migration myth is interesting as a story and from the fact that the region covered is, as previously mentioned, that of the Chaco culture range. Beyond these two things, however, there is little which agrees with the evidence revealed by excavation. In the first place nothing has thus far been found to show that any of the old sites with a predominance of black-on-white pottery of Chaco character can be attributed to the ancient Zuñi. This holds true even at Kiatuthlanna which, as already described, occupies a definite position in Zuñi tradition. In the Chaco Canyon and other districts to the north the ruins represent several stages in the chronology, from Basket Maker III to the end of Pueblo III. There probably was more or less contemporaneity between the various centers. Hence they can scarcely be attributed to a migratory group passing through the region. Furthermore, the ruins of the northeastern San Juan basin, in the Pagosa Springs region, indicate an antiquity greater than that of the Aztec Ruin. This suggests that the movement could hardly have been from Aztec. On the contrary, what probably did occur was that in the Basket Maker III and Pueblo I horizons the people spread into the region. During Pueblo III there was a contraction which led them back down the San Juan in the beginnings of the great movement which culminated in the abandonment of the northern frontiers at the close of Pueblo III.

The contrast between the story presented by archeological evidence and that which is embodied in the Zuñi traditions serves to emphasize a fact which older investigators were prone to overlook, namely, that too much reliance should not be placed upon primitive

[9] Morris, E. H., 1919 a, p. 104; 1921, pp. 136–137; 1924, p. 221; 1928, pp. 417–420.

myths and legends, especially when they deal with events viewed through the haze of great antiquity. Workers in the Southwest have found that traditions concerning archeological sites are for the most part unreliable. If they are referred to at all, they should be interpreted with great discernment.

The Long H Ranch lies in the center of a region which was the locale for many of the most colorful exploits in the history of the Southwest. From the earliest Spanish entradas down to the surveys by the westward expanding United States in the middle of the nineteenth century, the tides of exploration swept around but, with a single possible exception, never across the Twin Salt Lakes. Throughout the Spanish occupation of the area, with all of its attendant searching for mines, springs, and suitable places for settlement, the lakes appear to have passed unnoticed. If they were visited, it seems curious that no mention is made of them. This is particularly true since it is a land where every spring and water hole is of importance and the Spaniards were generally careful to note such natural features.

Friar Marcos of Niza, preceded by the negro Estevanico, traveled east of the Zuñi River a short distance beyond the borders of the ranch on the journey which led to the discovery of Cibola in 1539. The death of the negro at the hands of the Indians and the friar's hasty retreat to Mexico, after having but glimpsed his goal from afar, checked further investigations at that time. In the following year, as a result of the friar's accounts of what he had seen and heard, the Coronado Expedition was sent north. This was the beginning of the era of exploration which culminated in the conquest and colonization of New Mexico and eastern Arizona.

Members of Coronado's expedition went west and north from the Province of Zuñi, or Cibola, in 1540 to the Hopi towns.[10] Again in 1583 the latter villages were visited by Espejo and his companions. There is little doubt but what Coronado's parties, one under Tovar and a second under Cardeñas, crossed the northeast corner of the old Long H property. Espejo's group probably passed too far north. Coronado's men set out from Hawikuh (pl. 1), the first Zuñi village subdued and occupied,[11] while Espejo returned to Alona, the site of present Zuñi, from Hawikuh before starting west.[12] The route from Alona, or Halona, probably followed across to the west along the line of the present road to Navajo (pl. 1), meeting the trail from Hawikuh in the vicinity of Squaw Lake.

[10] Bandelier, A. F., 1892 a. Hodge, F. W., 1907. Winship, G. P., 1896.
[11] Winship, G. P., 1896, pp. 390, 488.
[12] Hammond and Rey, 1929, pp. 93–94.

The explorations by these earlier men, including others who did not get west of Zuñi, resulted in the conquest of New Mexico and eastern Arizona by Oñate. While the latter was at Zuñi in the autumn of 1598 he sent one of his captains, Farfán, to make a reconnaissance of the region round about. Farfán undoubtedly explored part of what is now the Long H Ranch and possibly reached the Twin Lakes. There is one statement in the accounts of this expedition which might be construed as a reference to the red lake. On November 8, 1598, Farfán made a deposition to the effect that 8 leagues westward from Granada, the Spanish name for Hawikuh,[13] he had found a large salt pool. Other accounts place the pool to the east and for that reason authorities have questioned his location of it.[14]

Farfán certainly should have been better informed on the direction of his pool from Hawikuh than other chroniclers of the Oñate explorations. Such being the case there is the intriguing possibility that his placing it in the west was correct after all. If such actually was true the lakes at the Long H Ranch are the only ones which answer to the description, both as to direction and to distance. Because of its extreme saltiness the red lake could easily qualify. Farfán's statement concerning the size of the pool which he saw does not agree with that of the red lake, but the early explorers were such notorious exaggerators that their figures must be greatly discounted. It seems rather curious, however, that he should have mentioned only one lake, if the Long H pool was the one which he reported. There is in this connection, however, a feature which may have a distinct bearing on the problem.

The two lakes, and the ranch houses, are in the bottom of a large depression which unquestionably was at one time a single large lake. Whether that was recent enough in southwestern history to fall within the early Spanish period is not known. Shifting sand dunes have encroached in large degree upon the red lake and the depression between it and the green pool and have obliterated to some extent the traces of the former large body of water. It is still possible to note, here and there, traces of the old shore line. If this single large lake was a recent historical actuality it may well have been the one which Farfán reported. Such a fact also makes it easier to reconcile frequent Zuñi references to Kiatuthlanna as "The Big Lake." Such an appellation is hardly appropriate for two small bodies of water. All this conjecture is not presented in an effort to prove that Farfán actually visited and reported the

[13] Hodge, F. W., 1912, pt. 1, p. 539.
[14] Bolton, H. E., 1916, p. 236, note 2.

Long H pool. It is offered only as one possible explanation of the difficulties which are involved in such an interpretation of his own deposition made at Zuñi in 1598.

During the early pioneering days of our own country a number of parties swung to the south of the ranch properties. Richard Campbell, with 35 companions, went from Santa Fe, N. Mex., to California by way of Zuñi in 1827.[15] From the pueblo they traveled down the west bank of the Zuñi River until they reached a point a short distance east of the Twin Buttes (pl. 1), where they crossed it. They continued southwest to the Little Colorado, crossed it, and journeyed on to the Upper Salt River, following an old Indian trail which led from Zuñi to the Apache country.

Emigrants to California frequently used that route. James Collier, collector of the port of San Francisco, and his military escort under Captain Thorn went that way in the early autumn of 1849.[16] One member of the party, Lieutenant Beckwith, apparently made a reconnaissance some distance west of the usual trail and according to the map of the Military Department of New Mexico for 1859, partially revised and corrected to 1867, must have passed close to the lakes. No report on this reconnaissance could be found. Beckwith played a prominent part in the railroad surveys a few years later but the only reference to him in connection with the Collier party which the writer was able to find is one made by Whipple. The latter with a party of topographical engineers was at the crossing of the Colorado River when Collier and his escort arrived. During the crossing of the stream Captain Thorn was drowned and Whipple notes that Lieutenant Beckwith succeeded to the command of the escort.[17]

Captain Sitgreaves and his survey party worked down the Zuñi River from the pueblo in September, 1851. They traveled the well-worn trail of the earlier groups as far as the crossing of the Little Colorado, where they turned northwest to follow the latter stream.[18] On this survey they traversed a considerable portion of the southern section of what was later to be the Long H Ranch.

The region to the north, which was to prove the better route, did not become known until somewhat later. F. X. Aubry returned from California in the autumn of 1853 with a party of 18 men. He followed the valley across from the Puerco of the West and passed in the vicinity of Jacob's Well and Navajo Springs (pl. 1), on his way to Zuñi.[19] This is essentially the route covered by Lieutenant

[15] Simpson, J. H., 1850, p. 137.
[16] Sitgreaves, L., 1853, p. 6. The spelling here is Captain Thom.
[17] Whipple, A. W., 1851, p. 15.
[18] Sitgreaves, L., 1853, pp. 5–7.
[19] Aubry, F. X., 1853.

Whipple and his party in their survey along the thirty-fifth parallel for a railroad line to the Pacific. Whipple's group camped at Jacob's Well on November 29, 1853, and at Navajo Springs on the following night. His is one of the earliest descriptions of the curious watering place called Jacob's Well.[20]

The well is located in the floor of the valley and the terrain around it is so level that one could easily pass within a few hundred yards of it and never suspect its existence. It is a conical pit approximately 300 feet (91.44 m.) in diameter and 125 feet (38.1 m.) deep. The size of the pool at the bottom varies from season to season—it practically dried up in 1928—but averages about 100 feet (30.48 m.) in diameter. It is surrounded by reeds and brush. The water is slightly brackish in taste but not displeasing to stock. The well has long been a gathering and watering place for the wandering Navajo and in recent years has frequently been the camping place for cattlemen and sheepmen.

Whipple is the first to record the ruins in the vicinity of Navajo Springs. Strange as it may seem, no fuller account of them is to be found in any subsequent writings. Even the archeologists who have been in that vicinity have been content to do little more than mention them. This may to some extent be attributed to the fact that no scientific work has been done in them.

Perhaps the most unusual caravan to cross that section of the country was the one under E. F. Beale. As a matter of fact it is unique in the annals of the Southwest. Beale was the superintendent in charge of the group surveying a wagon road from Fort Defiance, Ariz., to California. It fell to his lot to test the theory of Jefferson Davis, then Secretary of War, on the use of camels in the Southwest. Consequently, in late August and early September of 1857 the long cavalcade of mules, horses, wagons, and camels plodded its way from Zuñi to Jacob's Well, Navajo Springs, and on west. The present road from Zuñi (pl. 1) follows very closely the route laid out by Beale. The main difference is that it swings slightly north of Jacob's Well and Navajo Springs to the present town of Navajo on the railroad. Beale retraced his steps early the following year, stopping at Navajo Springs and Jacob's Well on February 15 and 16.[21]

Navajo Springs played its brief rôle in the history of Arizona in December of 1863 when it became the temporary capital of the territory. Gov. John M. Goodwin, appointed by President Lincoln, and party encamped there and formally organized the government of the newly created territory on the 29th day of the month. A

[20] Whipple, A. W., 1856, pt. 1, pp. 72–73.
[21] Beale, E. F., 1858. Bonsal, S., 1912.

few days later they moved on and the springs once more became a mere watering place for Indians and emigrants.[22]

The settlement of the region in the Long H Ranch vicinity began in the early seventies when New Mexican sheepmen and cattlemen spread into the valley of the Little Colorado River. The town of St. Johns, south of the Long H (pl. 1), was started in the autumn of 1873 by Sol Barth, his two brothers and a number of Mexicans. As a compliment to the first woman to settle there, one Maria San Juan Baca de Padilla, Barth called the settlement San Juan, the name being changed to its English equivalent at a later date. The Barth interests were purchased by the Mormons in 1879 and from that time on the town grew fairly rapidly, though not always peacefully.[23]

The earliest date which can definitely be associated with the Twin Lakes is 1881. In that year C. O. Howe, who was in Arizona representing the Wabash Cattle Co. of Logansport, Ind., found a Mexican living in a small cabin at the Twin Lakes. Mr. Howe secured extensive holdings in behalf of his company and in the latter part of 1881 or early 1882 bought out the Mexican and established headquarters at the lakes. The Wabash Cattle Co. branded its stock on the left shoulder and hip with a long H. Out of that custom developed the name, the Long H Ranch. Subsequently the properties were under the Tucker-Church Co., then Tucker and Saunders, and finally they were incorporated as the Tucker Livestock Co. In 1924 the bondholders took over the property and still own it. The sites marked Hard Scrabble and Prospect on the map (pl. 1) are part of the holdings. The Stamps and V Stripe ranches belonged to the original Long H properties but have since passed into other hands.

Archeological explorations at the Long H seem to have been about as lacking as the other kinds of investigation in the region. Bandelier went down the Zuñi to the Little Colorado in 1883 and worked the area to the south. He did not go north of the Zuñi, however, being content to state that it was not a country for Indian tillers of the soil and no ruins need be looked for in the region.[24] In 1901 Doctor Hough worked several miles northwest of the Long H. He mentions the ranch but did not visit it and makes no reference to the existence of ruins on it.[25] Dr. Leslie Spier was at the Long H in November, 1917, while making a survey of the Little Colorado area for the American Museum of Natural History. He is apparently the first to record the existence of the ruins. He only made a brief inspection of the sites but did bring them to the attention of

[22] Bancroft, H. H., 1889, p. 521.
[23] McClintock, J. H., 1921, pp. 177–183.
[24] Bandelier, A. F., 1892 b, p. 386.
[25] Hough, W., 1903, p. 320.

archeologists.[26] Since then several parties have visited the ranch but no work was done, except for a few exploratory trenches dug by Kidder in 1923.

To some readers the foregoing ethnological and historical digression may seem entirely beyond the bounds of an archeological report. It is true that it has no direct bearing on the investigations conducted during the summer of 1929. General books on the area, however, practically ignore the small section under consideration. Consequently the writer feels that a better appreciation of the region will be had if some of the outstanding nonarcheological factors are presented. There is such a dearth of material and what little is available is so widely scattered that it has been deemed permissible to bring it together in this introduction.

HOUSE REMAINS

The ruins investigated during the field season of 1929 constitute a fairly compact group three-fourths of a mile (1.207 k.) northwest of the ranch houses at the Twin Salt Lakes. There are many additional sites in the immediate vicinity, but no work was attempted in them. It was thought that more complete information was to be obtained from a thorough investigation of a single small area than from a series of scattered excavations. At the completion of the summer's work the remains of three different types of houses had been uncovered. These included 18 pit houses, the vestiges of three jacal, pole and mud structures, and a pueblo ruin with 49 rooms and 4 kivas or circular ceremonial chambers.

Before excavations were started there was nothing to indicate the presence of pit-house remains. Judging from the pottery fragments on the surfaces of the low, débris-covered sand mounds, jacal or crude adobe ruins were to be expected, but the pit houses furnished a complete surprise. The pueblo was so thoroughly covered by sand that the only evidence of its existence was in the sporadic occurrence of occasional groups of aligned stones, tops of remaining walls, on the surface of the mound. At the beginning of the season the writer had no intention of excavating the pueblo ruin. As investigations on the pit houses progressed, however, he became more and more impressed with the idea that it might be possible to obtain some stratigraphic evidence on the relationship between the two types of structures. With such a possibility in contemplation the débris was cleared from the pueblo. This task was not easy because it entailed more than the mere removal of fallen wall material and accumulated drift sand. It unexpectedly called for the solution

[26] Spier, L., 1918, p. 356.

of an intricate problem of change and growth in a communal dwelling. The results of this work form an interesting story, which will be presented in detail in a later section of this report. Ultimately the original purpose in excavating the pueblo was achieved by the discovery of a complete pit house under its northeast end. This last feature brought that phase of the investigations to an entirely satisfactory conclusion, since it definitely established the greater antiquity of the pit form of dwelling.

The only disappointing part of the summer's work was that in connection with the jacal structures. While the remains of three such dwellings were found, in not one instance was it possible to trace the exact outlines of the buildings. The same condition held with respect to the superstructure. There was evidence to show that pole and mud walls had existed, but the disintegration was so complete that their true character could not be learned. Hence this particular form of domicile can not be properly described. Several variations of the type have been found in other localities [27] and certain features about the Long H remains suggest some of the latter to a slight degree.

Pit Houses

The information obtained in excavating the 18 pit houses makes it possible to draw a reasonably accurate picture of such dwellings. They had consisted of roughly circular, oval, or rectangular pits roofed over with a pole, brush, and plaster superstructure.

The pit portions of the houses were dug into the native soil to a depth ranging from 16 inches (40.64 cm.) to 8 feet (2.438 m.). In diameter they varied from 7 to 24 feet (2.133 to 7.315 m.). The earth floor and walls of the excavation were covered with thick plaster made from adobe mud which contained a slight admixture of wood ashes. In not one instance was it found that large stone slabs had been used to line the walls of the pit. The latter feature is frequently present in the remains of houses of similar nature in the region to the north.[28]

The superstructure was supported on four upright posts placed in the floor some distance from the walls. Although there was nothing to indicate that such had been the case, the upper ends of these supports probably were forked, a tree trunk with a suitable crotch being used for the purpose. The four uprights carried stringers which formed a rectangular framework upon which the small poles forming the sloping section of the superstructure rested. The rectangular space at the top probably had a flat roof with a single

[27] Roberts, 1930.
[28] Roberts, 1929.

opening in the center which served both as a smoke hole and an entrance. The wooden framework thus formed was covered with reeds, brush, and leaves. Over all a thick layer of carefully smoothed mud plaster was spread. In the case of the dwellings with deep pits this roof was probably only sufficiently elevated above the ground to provide for drainage. Where a shallow pit had been used the superstructure must necessarily have risen several feet above the surrounding level.

Variations of this type of superstructure are not unknown in other regions of the Southwest. Kidder and Guernsey reported it from northeastern Arizona.[29] Judd uncovered traces of one near Pueblo Bonito in the Chaco Canyon and reports similar construction for the coverings of earth lodges near Willard, Utah.[30] Cummings has referred to excavated circular rooms with poles, brush, cedar bark, and plaster roofs which he investigated in the Kayenta district.[31] Morris has described a closely comparable form which he observed in Canyon del Muerto, northeastern Arizona.[32] The Late Basket Maker Village uncovered in the Chaco Canyon in 1928 gave abundant evidence of houses with a similar superstructure.[33]

Interior furnishings in the houses were simple. Near the center of each room was a fire pit. Adjacent to it, on the southeast side, was a depression in which rested the base end of the ladder used in entering and leaving the structure. Almost invariably at the opposite side of the fire pit, the northwest, was a small circular hole in the floor. The exact purpose of this feature has never been determined. All indications, however, suggest that it is analogous to the small hole which occupies a similar position in the floors of later-day kivas. The latter, called the sipapu, according to the Zuñi, Hopi, and other Indians of the Southwest, was symbolic of the mythical place of emergence through which their ancestors passed on their journey from the underworld to the surface of the earth. That it had the same significance in the pit houses can only be postulated. In discussing the feature in connection with the series of Chaco Canyon Basket Maker III houses, the suggestion was offered that it possibly did serve a similar purpose. On the basis of such an assumption it was conjectured that in the pit-house horizon each dwelling had its own shrine commemorating the important mythological event. Later, apparently, it was deemed

[29] Kidder, A. V., and Guernsey, S. J., 1919, pp. 43–44.
[30] Judd, N. M., 1924, p. 405; 1926, p. 8.
[31] Cummings, B. S., 1915, p. 274.
[32] Morris, E. H., 1925, p. 272.
[33] Roberts, 1929, pp. 10–13.

essential only to the ceremonial chamber and is not always present there.[34]

Some of the dwellings had storage recesses in the wall, while occasional small holes in the floor apparently served as receptacles for minor objects. In a few instances there was evidence to show that small circular depressions in the floor had been used as pot rests. The rounded bottoms of the containers in service at that time would necessitate some support to keep them in an upright position and such depressions would admirably serve the purpose. Several had the fragments of broken jars in them which clearly showed their function. Similar use of floor depressions has been found in pit structures in the region to the north.[35] There were large oval depressions at one side of the room in several of the structures. The latter seem to have been associated with milling stones or metates. Just what their function may have been is questionable. The metates were not placed in the depressions but on the floor at one side. It is possible that the corn to be ground was placed in the depression or the finished meal may have been allowed to fall into it from the end of the grinding stone, thence to be placed in jars.

At the east or southeast side of each room was a ventilator. This consisted of a short tunnel leading from an opening in the wall to the bottom of a vertical shaft, the upper end of which opened to the air on the surface of the ground beyond the confines of the dwelling. The ventilator was just what its name implies. When a fire was burning in the pit in the center of the room the heat rising from it and passing off through the smoke hole at the top would have a tendency to draw fresh, cold air down through the shaft and tunnel and into the room. Evidence has shown that the feature was not originally designed for such a purpose. It represents a modified survival of the entrance found in the earlier forms of the pit houses, the dwellings of the Basket Maker III period. It even continued down into later pueblo horizons in the kivas or ceremonial chambers.

An upright slab of stone, called the deflector, was set in the floor between the fire pit and the ventilator opening in many of the houses. The reason for its presence is that it was so placed to prevent the inrushing air from blowing directly on the flames. Many of the rooms had a second stone which could be placed in the ventilator opening and entirely close it. Perhaps at times the draft became so strong that it was necessary to completely stop it. The ventilators in some of the deeper houses work so well that

[34] Roberts, 1929, p. 13.
[35] Martin, P. S., 1930, p. 29.

even in the present roofless state of the structures a strong current of air can be felt passing into the chamber from the tunnel.

Houses of this type were found in clusters. The number of dwellings varies, but it consistently ranges between three and six. These groups possibly represent family or clan units, the homes of a mother, her daughters, and their families. Any number of these units, from one to a dozen, might be associated to form a village. Three units were excavated during the season. One house and half of another in the fourth group were cleared, and the outlines of the remaining two structures were traced. Several small pits occupying isolated positions were also investigated. These single dwellings may represent the beginnings of a family group, the full development of which was not realized because of some unrecorded happening which checked its growth.

At the east or southeast side of each unit was a trash mound where the refuse from the houses had been deposited. In most cases these mounds had also been the burying ground for the dead. The exceptions to the rule were the interments which were made in abandoned storage pits and vacated houses.

Three of the units will be discussed in detail. The numbers given to them merely indicate the order in which they were investigated. As a matter of fact, however, there is a certain significance in the designation. The No. 1 group proved to be the most complex, and its houses show a higher development than those of the other units. Group 3 appears to have been the simplest and certain aspects of its houses indicate that they represent an earlier form. To facilitate discussion the several groups will be considered in their numerical order, although such a procedure necessitates passing from the ultimate development to simpler stages of the dwelling type.

GROUP NO. 1

House Group No. 1 consisted of the remains of 4 dwellings, 6 storage pits, and 6 surface fire pits. Except for the central cluster of houses with the two adjacent fire pits, storage bin, and refuse mound, there was little of interest in the group. The additional storage and fire pits were of the same characteristic form, and because they were located at some distance from the central group they have not been included in the plat. To have done so would have necessitated the use of a scale too small to permit the drawing of any details. The outstanding feature of the group as a whole was the compact house cluster formed by houses B, C, and D. The two small structures were not only contiguous to the large central one, but the bench portions of the three actually overlapped. (Fig. 1; pl. 3, *a*, *b*.) It

is not unusual to find houses aligned in such a fashion that they might be considered as touching. A complex association like that presented by the three houses in Group 1, however, is somewhat out of the ordinary.

The remains of house A, Group 1, were a good example of the roughly circular form of dwelling and were typical of the fully developed pit structure as found in the region. The major portion of the house had consisted of a pit with an encircling bench some distance above the floor level. Both pit and bench had been dug into the native earth. The walls and floor had been plastered with a thick coat of adobe mud. The excavation had been covered over with a pole, brush, and plaster superstructure of the kind described in preceding pages. All that was left of the roof, however, was the decayed butts of the main support posts in the holes in the floor and a few decayed pieces from some of the sloping side poles which were lying on top of the bench. In the houses with the encircling bench the small side poles of the superstructure had sloped from the back of the bench to the stringers comprising the central rectangular framework on top of the main support posts. Occasionally these smaller poles had their lower ends embedded in the earth at the back of the bench, but such had not been the case in house A where their butts simply rested in the angle formed by the top of the bench and the wall.

Near the center of the room was a circular fire pit and adjoining it the rectangular box where the base end of the ladder rested. (Pl. 3, *c*.) Both were inclosed by an adobe rim. Between the two pits the plaster was reinforced by a small stone slab the top of which was flush with the upper surface of the fire pit ridge. The fire pit was saucer shaped, while the sides of the ladder box were more vertical.

The finding of the ladder boxes or pits proved interesting from several points of view. The first ones uncovered presented something of a problem because there was nothing which definitely suggested their purpose. That they had not been secondary fire pits was certain as there were no traces of heat on the plaster. The supposition that they might have functioned as temporary depositories for ashes from the fire was not tenable because there was no such material in them. Careful inspection of the interiors showed that the bottoms and the ends farthest away from the fire pit were abraded to some extent. From this it was presumed that a ladder might have rested in them. Definite proof that such was their function was later obtained in several structures where decayed ends of the ladder poles were found partially embedded in the plaster at the ends of the boxes. This was not only valuable infor-

mation in itself, but it substantiated a postulation made in connection with the series of Basket Maker III houses uncovered two years previous. Several of the latter had small, oval-shaped depressions in the floor at one side of the fire pit, the side nearest the ventilator or passage opening. In discussing them it was suggested that they possibly might have been the place where a ladder end rested, as some such provision would have been necessary to prevent the object's slipping on the smooth surface of the plaster.[36] That this postulation was correct seems certain in view of the present evidence. Here, then, is an interesting example of how comparatively elaborate house features may develop from a very simple beginning. What was originally an inconspicuous depression in the floor eventually grew into a distinct pit with a bordering rim of plaster.

Evidence also showed that the ladders had sloped in such degree that they had passed over the fire pit to the central hole in the roof. Their tops pointed in a more or less northerly direction. Northward pointing ladders were one of the outstanding characteristics of later-day kivas. That they were a normal feature in the pit structures adds one more point of similarity to the already large number of comparable features in the old house forms and subsequent ceremonial chambers. To some it may seem that it would have been dangerous to have the ladder placed so close to and passing directly over the fire pit. There was probably no likelihood of its catching fire, as a very small blaze in such a structure would have been sufficient for what little heat and light was required. The fact that the ladder was set in that fashion would tend to lessen the size of the hole required for entrance. If it had had a marked slant a larger opening would have been needed than if it rose almost vertically.

There were several small holes in the floor of house A in addition to those in which the support posts had rested. The one marked *b* on the ground plan (fig. 1) has been considered analogous to the sipapu previously mentioned. The hole marked *e*, which was directly in front of the opening into the ventilator, had contained a small post. The latter was probably for the purpose of holding in position the stone slab which was used to close the opening. The other two holes marked by the same letter gave no indication of their probable function. They possibly were for the storage of small objects.

At one side of the room, near one of the main support posts, was a depression in the floor which extended back into the face of the bench. This was a good example of the wall recess mentioned in

[36] Roberts, 1929, pp. 26, 38, 47.

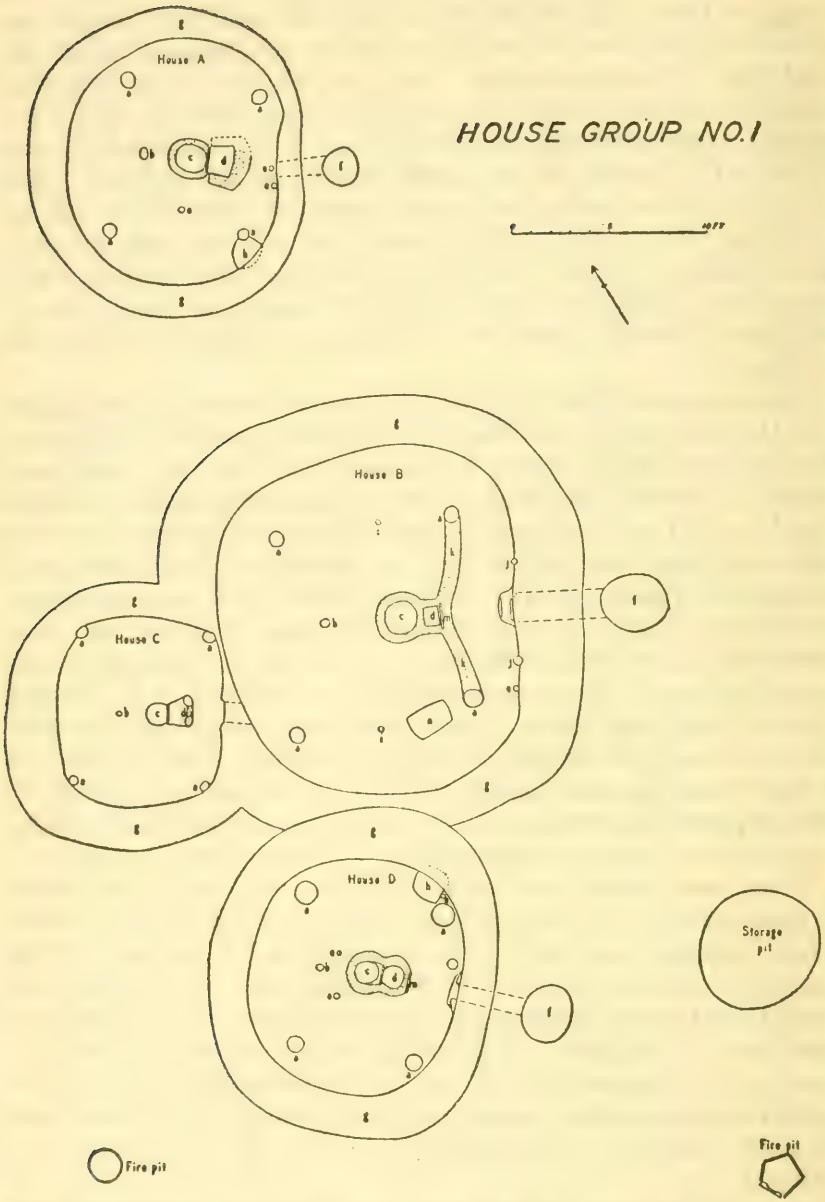


FIGURE 1.—Plan of central portion of House Group No. 1: *a*, Holes for main support posts; *b*, sipapu; *c*, fire pit; *d*, ladder pit; *e*, holes in floor; *f*, ventilator shaft; *g*, bench; *h*, subwall storage recesses; *i*, holes for loom posts; *j*, posts reinforcing face of bench; *k*, plaster ridge connecting rim around fire and ladder pits and the support posts; *m*, deflectors; *n*, depression in floor

the general introduction to the subject of the pit houses. Such a place would have been convenient for storing almost anything which the occupants of the dwelling desired to set out of the way. It is rather curious that in the Southwest in general the subwall recess was only occasionally used in the houses of the Basket Maker III period, while in the dwellings of Pueblo I it occurred quite frequently.

The ventilator at the southeast side of the room was of the type which is one of the characteristic features of the houses. As will be observed from the ground plan (fig. 1), the arc on the ventilator side of the chamber broke the natural curve of the circumference to such an extent that it actually bowed in. This change in the bend of the wall was observed in many of the structures, although in most of them it consisted of a flattening rather than a distinct incurve. In this, as well as in several other houses, the flattening or incurve was not fortuitous. It is directly traceable to certain constructional methods followed by the builders. The ventilator tunnel was dug at the same time as the pit proper. The general practice seems to have been that of making a wedge-shaped trench in the section of the wall where the ventilator was to be placed. This trench did not completely penetrate to the vertical shaft of the ventilator. It terminated at about the back line of the bench. From that point to the bottom of the shaft the earth was actually tunneled. The forepart of the horizontal passage was formed by the erection of a wooden framework. A series of small poles with forks at their upper ends supported crosspieces covered with reeds and brush. This wooden tunnel was then plastered inside and out with a thick layer of adobe mud. The front portion of the trench, where it was cut through the side of the chamber, was closed by the erection of an adobe wall which rose to the height of the bench. This completed the wall on that side, leaving, of course, the ventilator opening. The remainder of the trench was filled in with earth, generally débris of accumulation from a trash mound, to the top of the bench. After this had been done the entire room was plastered and all signs of construction covered over.

House A gave indications of having fallen into disuse prior to the abandonment of the whole group. It was completely filled with refuse and such débris as accumulates around an occupied site. Layers of clean blow sand such as constituted the upper part of the fill in the other structures were absent from this pit. Among the Pueblo peoples it is customary to deposit refuse in rooms no longer tenanted, and the same practice may have prevailed in this earlier period. Another factor which indicated abandonment was the finding of burials in the ventilator where two complete skeletons and one additional cranium were uncovered. The skull was well down in

the shaft and the skeletons, one lying above the other, were near the top. The complete remains showed definite burial and can not be attributed to a mere dumping of bodies into an open shaft. The presence of only a skull from a third individual is more puzzling and will be referred to again under the subject of burials. What reason the occupants of house A may have had for quitting it could not be learned.

The inside diameter of house A on the line of the ventilator was 10 feet 9 inches (3.276 m.). Above the bench on the same line it was 14 feet 2 inches (4.318 m.). On a line at right angles to the preceding one the diameter inside the bench was 12 feet 8 inches (3.86 m.), and including the bench, 15 feet 10 inches (4.826 m.). The depth of the pit ranged between 6 feet 6 inches (1.981 m.) on the ventilator side and 7 feet (2.133 m.) at the opposite wall. The average height of the bench above the floor was 4 feet 3 inches (1.295 m.). The width of the bench ranged from 1 foot 3½ inches (39.37 cm.) above the ventilator to 2 feet (60.96 cm.) at the opposite side of the room.

The fire pit was more oval than circular in outline and ranged from 1 foot 5 inches (43.18 cm.) to 1 foot 7 inches (48.26 cm.) in diameter. It had a depth of 3 inches (7.62 cm.) below the floor level, but the inclosing ridge of plaster added another 3 inches (7.62 cm.), making a total of 6 inches (15.24 cm.). The rim around the pit had an average width of 5 inches (12.7 cm.).

The ladder pit, which was more or less rectangular in form, measured 1 foot 3 inches (38.1 cm.) by 1 foot 6 inches (45.72 cm.). Its depth was somewhat greater than that of the fire pit, averaging 7 inches (17.78 cm.). The ridge of plaster which inclosed it measured 6 inches (15.24 cm.) wide at one side and 10 inches (25.4 cm.) at the end. The rim had been broken away at the opposite side, but its traces on the floor indicated the same average width as the side which was present, 6 inches (15.24 cm.).

The sipapu was 1 foot 1 inch (33.02 cm.) from the edge of the fire-pit rim. The hole was oval in shape with diameters of 5 and 7 inches (12.7 and 17.78 cm.). Its depth was 11 inches (27.94 cm.). The hole in front of the ventilator opening was 3 inches (7.62 cm.) in diameter and 9 inches (22.86 cm.) deep. It slanted toward the room at an angle of 15° from the vertical. The additional small holes in the floor averaged 3 inches (7.62 cm.) in diameter and 6 inches (15.24 cm.) in depth.

The holes for the main support posts were set into the floor at varying distances from the wall of the room. Two of them were 6 inches (15.24 cm.) from the face of the bench, one was 9 inches

(22.86 cm.), and the other was 10 inches (25.4 cm.). The average depth of these holes was 2 feet 6 inches (76.2 cm.).

The corner recess had a maximum width of 1 foot 5 inches (43.18 cm.) and a maximum length of 1 foot 9 inches (53.34 cm.). It extended under the wall 3 inches (7.62 cm.). The bottom of the pit was 2 inches (5.08 cm.) below the general floor level.

The opening from the room into the horizontal passage of the ventilator was 10 inches (25.4 cm.) wide and 1 foot 10 inches (55.88 cm.) high. The sill of the tunnel at the room opening was 3 inches (7.62 cm.) above the floor. The tunnel was 2 feet 5 inches (73.66 cm.) long. Where it opened into the shaft it was somewhat larger than at the room end. At this point it had a height of 2 feet (60.96 cm.) and a width of 1 foot (30.48 cm.). The shaft, at the outer end, was roughly oval in shape. It had a diameter of 1 foot 10 inches (55.88 cm.) on a line with the tunnel and a cross diameter of 2 feet (60.96 cm.). The bottom of the shaft was 6 feet (1.828 m.) below the ground level.

Houses B and C really should be considered as a single unit. They had a number of features in common and in some respects it is difficult to dissociate one structure from the other. To facilitate discussion, however, they will first be described singly, as far as possible, then as a combination. Although house D constitutes an integral part of the group, its relationship to house B was such that it could quite properly be considered as a single structure.

House B was the largest of the four dwellings in this group. Its major portion had been a roughly oval pit dug into the native earth. The encircling bench was of the same type as that in A, except for the fact that its rear wall was broken at two points by the abuttal of the other houses. At the ventilator side of the room there was a pronounced flattening of the wall. The slight incurve near the opening proper was not, strictly speaking, a characteristic of the wall. It was due to the addition of an adobe "apron" in front of the opening in the wall proper. (Pl. 4, *a*.)

The superstructure had rested upon four main posts set in the floor some distance from the walls. The decayed butts of these posts were still in place at the time when the débris was removed from the pit. The wood, as in all cases where pieces were found, was cedar. The lower ends of the sloping side poles here, as in house A, simply rested in the angle formed by the back wall and top of the bench. There were no indications that any had been embedded in the earth. This part of the superstructure was probably characteristic in form, except for that portion where house C broke into the bench. Just how this portion was covered is not clear. A number of ways suggest themselves, but there was little to show the

method actually used. Careful consideration of the whole problem has led to the conclusion that the sloping poles were not employed beyond the corners where the two benches, those of B and C, came together. The space between the rectangular frameworks carried by the main support posts of the two houses probably had a flat roof, a continuation of the similar sections of the two houses. Inasmuch as the earth wall between the two rooms apparently did not rise much above the level of the benches, such a construction would have left a large opening between the two chambers. This would have resulted in a unique example of a double-roomed pit house. Other factors, however, argued against such a possibility. In the débris at this point there were many large fragments of adobe plaster showing the imprint of small sticks. The condition of the top of the wall between the rooms indicated that a form of wattle screen had been erected in the opening, resting on the adobe partition, thus shutting off one chamber from the other. The actual evidence for this reconstruction is not as complete as could be desired, but considering all of the features involved seems to be the most plausible.

In order that the manner of building the superstructure might be more readily understood the accompanying diagram was prepared. (Fig. 3.) It should be borne in mind that this is not offered as an illustration of the actual method of construction, a thing which can never be known, but as a postulation based on evidence found in the ruins of the dwellings.

On the side where house D cut into the bench of B the poles probably sloped in the normal way. The fact that the bench of D was considerably lower than that in B (fig. 2), together with the lack of a rear wall to the B bench along that section, suggested that the D superstructure was erected first. The butts of the B poles could then have rested on and been braced against the sloping wall of D. This conclusion was augmented by the discovery that the plaster top of the B bench, where it overlapped that of D, was laid on a fill of intentionally placed débris. The diagram (fig. 4) quite clearly illustrates the various factors involved in the roof construction along this side of the house.

The fire pit near the center of house B approximated the circular form. The adjacent ladder pit was rectangular in outline. Both were bordered by a plaster rim. In this house the ridge was continuous and not only encompassed the two pits but it extended along the floor to the support posts on that side of the room. (Fig. 1.) This more or less had the effect of setting off that portion of the chamber.

The presence of the ridge between the pits and the support posts is of special interest because it suggests a feature which was prev-

alent in the slab-lined pit structures of the Basket Maker III horizon. In many of the latter there was a binlike compartment on the southeast, the ventilator side of the room. This compartment was formed by the erection of a low cross wall along the line of the two support posts. The wall consisted either of stone slabs placed in an upright position with their lower ends embedded in a plaster ridge, adobe,

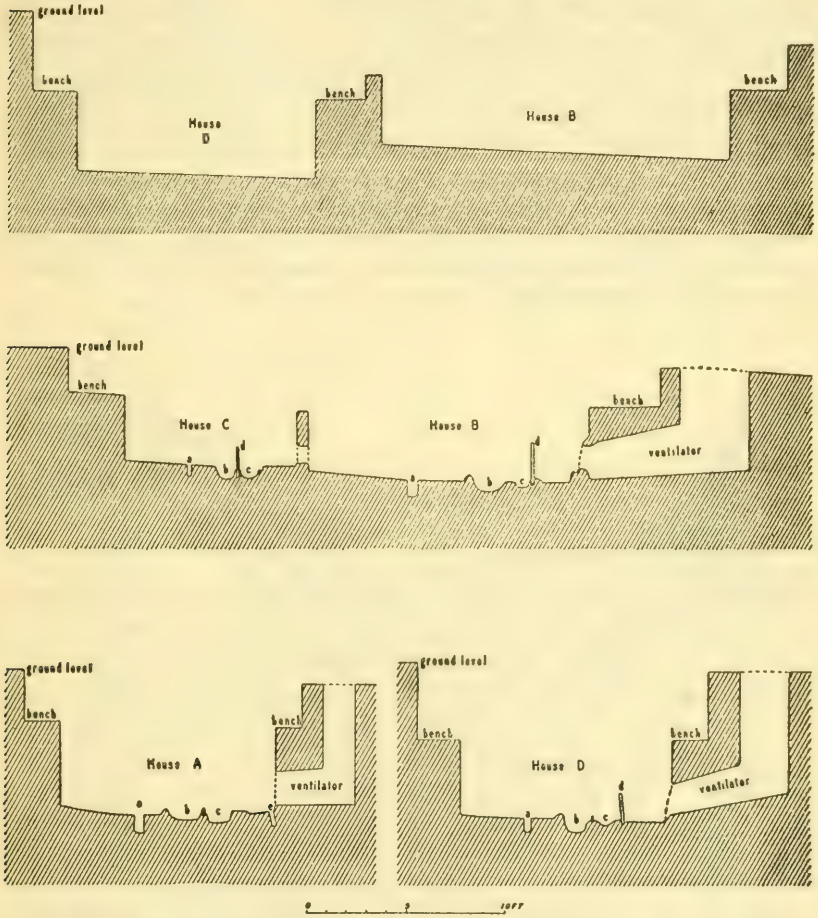


FIGURE 2.—Sections through houses in Group No. 1; *a*, Sipapu; *b*, fire pits; *c*, ladder pits; *d*, deflectors; *e*, hole for post to hold stone closing the ventilator opening

or wattle and daub construction. There generally was a break in this wall directly in front of the ventilator opening or, as it was in many of those structures, passage entrance. In front of the break in the cross wall, either between it and the fire pit or between it and the opening into the passage, was an upright stone slab which was the prototype of the deflector. Houses which did not have an actual compartment presented the suggestion of one in plaster ridges

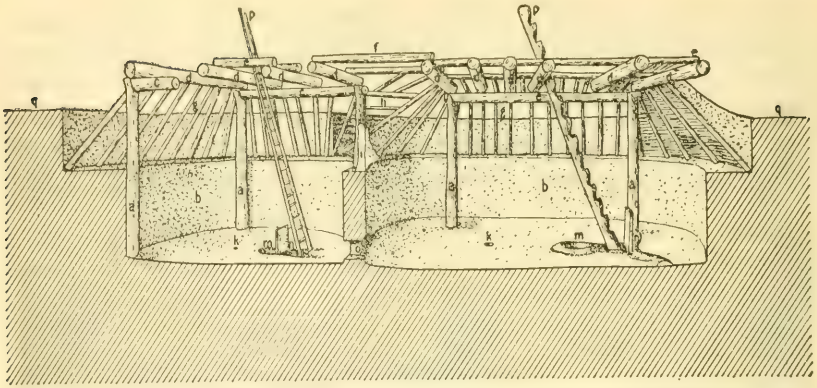


FIGURE 3.—Postulated method of superstructure construction for houses B and C, Group No. 1: *a*, Main support posts; *b*, faces of benches; *c*, main stringers; *d*, lesser roof timbers; *e*, small roofing poles; *f*, timbers bridging space between rectangular frameworks; *g*, sloping side walls; *h*, timbers connecting sloping walls of two structures; *i*, wattle wall between rooms; *k*, sipapu; *m*, fire pits; *n*, deflector; *o*, ventilator of C opening into B; *p*, ladders; *q*, ground level

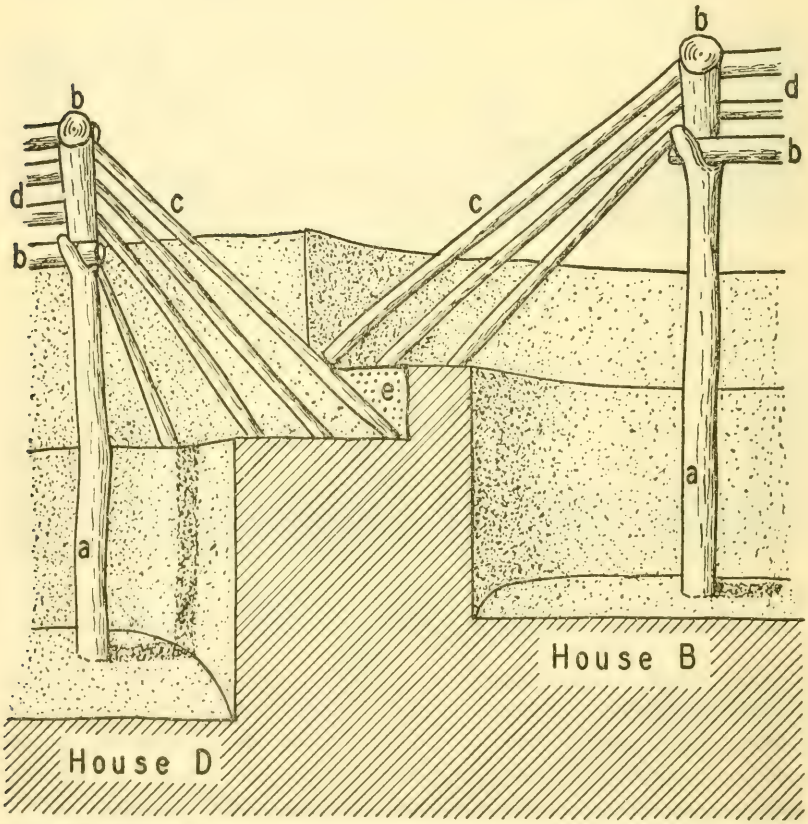


FIGURE 4.—Detail of superstructure construction in houses B and D: *a*, Main support posts; *b*, main stringers; *c*, sloping side poles; *d*, small roof timbers; *e*, fill over side poles of D which furnished foundation for sloping timbers of B

which radiated from the fire pit to the wall.[37] The ridge in house B was similar to the latter, except for the fact that it did not continue to the wall but stopped at the support posts. There was only one other structure in the 18 pit houses on the Long H Ranch, house D of Group 3, which suggested a similar feature. It did not have a ridge, however, but the entire floor level at that side of the room was slightly elevated to make a low platform.

The presence of these two examples in the houses under consideration has a bearing on one of the problems which arose in the study of the Basket Maker III domiciles. The occurrence of compartments in some of the house remains and only adobe ridges in others raised the question as to which was the earlier, whether the compartment preceded the ridges or was an outgrowth from them. The conclusion was reached that the ridges probably represented a breakdown in a house feature which previously had been considered essential. As will be shown later in this report, the Long H houses probably belong to a later stage than the Basket Maker III forms in the Chaco Canyon. Since there was just the mere indication of a setting apart of a portion of the room in the former it would seem that the belief that the ridge was simply an unobtrusive survival of what originally was a distinct feature was correct.

The hole in the floor which has been considered analogous to the sipapu was present in this structure. It was more nearly circular than the one in house A and its sides were carefully plastered. At the time when the pit of the house was cleared of accumulated débris the sipapu was filled with clean sand. This is a condition frequently found to exist. It is possible that the filling of the hole with sand may have had the same significance as the covering of the sipapu with a flat stone or board in later kivas during the interval when no ceremonies are being performed.

There were several other holes in the floor, two of which were of particular interest. They were at opposite sides of the room about midway between the main support posts. (Fig. 1, *i*.) They were not storage places because the sides of their earth walls showed distinctly the marks of wood—that poles had been set in them. Timbers so placed might have served as additional supports for the roof but their size, as shown by the diameters of the holes, was such that they would not have been of material value in that capacity. Another explanation for the presence of posts in those particular positions is that they may well have been the portions of the framework of looms used in weaving. With one of the main superstructure posts serving as one side and one of the small poles as the other a very serviceable loom could have been devised. If such was

[37] Roberts, 1929, pp. 10–71.

done, house B may be considered as having had provision for two weaving frames, making it possible for two people to work at the same time.

At the front of the bench on the ventilator side of the room was a circular hole in the floor. (Fig. 1, *e*.) Its sides were plastered and it may well have served as a depository for small objects. The other two holes (fig. 1, *j*) had contained posts used in the construction of the wall which was erected to close the trench dug for the ventilator tunnel.

At the south side of the room, between the main support post and the small pole which has been considered to have been part of a loom, was a roughly rectangular depression in the floor. (Fig. 1, *n*.) Just what its function may have been is not known. It is possible that fuel for the fire may have been piled in it or, as suggested in the introduction to the subject of pit houses, it may have had some connection with the grinding of corn. A broken metate or milling stone was found on the floor near by. The corn to be ground may have been placed in it, close to the miller, or the metate may have been in such a position that the open end of the groove or trough was toward it in such a fashion that meal could fall into the depression.

The ventilator in this dwelling was one of the most elaborate found during the investigations. It had been constructed along lines similar to that in house A. When the front wall was erected to close the wedge-shaped trench two posts were incorporated in it. (Pl. 4, *a*.) This was shown by their impressions in the plaster of the bench. The builders possibly felt that a wall of mud alone would not be sufficient and so used the wood to reinforce it. The posts did not rise to the top of the bench. They terminated on a line slightly above that of the upper part of the ventilator "apron." The opening itself was smaller than the mouth of the tunnel, due to the apronlike feature which had been erected in front of it. The sill of the smaller doorway in the "apron" was grooved to hold a slab of stone and there was a slight offset in the rim of the opening which permitted the door to fit tightly into the aperture. The stone was in position in front of the opening when the interior of the chamber was cleaned out. Between the opening and the fire pit was an upright slab of stone, the lower end of which was embedded in the plaster ridge. (Figs. 1, *m*; 2, *d*; pl. 4, *a*.) This constitutes a good example of the deflector.

The ventilator tunnel of house B was larger than that in A. Its floor sloped slightly upward toward the shaft. The entrance to the tunnel at the outer end was much larger than the opening into the

room. The shaft was somewhat oval in contour with its long axis on a line with the tunnel.

The diameter of house B on the ventilator line, inside the bench, was 15 feet 2 inches (4.622 m.). Above the bench it measured 21 feet 9 inches (6.629 m.). The diameter at right angles to the ventilator line was 17 feet 8 inches (5.384 m.). On the same line from the back of the bench on one side to the break caused by house D it measured 21 feet (6.4 m.). When the chamber was occupied and the bench extended over a portion of the fill covering the house D superstructure, the diameter was several inches greater.

The depth of the pit varied somewhat. In front of the ventilator the floor was 6 feet (1.828 m.) below the ground level. At the north side it was 5 feet 9 inches (1.752 m.) and at the south 6 feet 1 inch (1.854 m.). The bench height also differed to some extent from one side of the room to the other. In front of the ventilator it was 3 feet 9 inches (1.143 m.) above the floor, 3 feet (91.44 cm.) between B and C, and 3 feet 6 inches (1.066 m.) on the other two sides. There was considerable variation in the width of the bench. The narrowest portion, with the exception of the segments where there was no overlapping, was 2 feet (60.96 cm.) and the broadest 3 feet 7 inches (1.092 m.).

The fire pit had an average diameter of 1 foot 8 inches (50.8 cm.). Its maximum depth below the floor level was 6 inches (15.24 cm.). The added 3 inches (7.62 cm.) of the plaster rim gave it a total depth of 9 inches (22.86 cm.). The ladder pit was shallower. Its bottom was only 3 inches (7.62 cm.) below the floor, although the total depth from the top of the plaster rim was 6 inches (15.24 cm.). The deflector stone which was embedded in the plaster ridge at the edge of the ladder pit was 2 feet (60.96 cm.) high, had a width of 1 foot 3 inches (38.1 cm.), and was 2 inches (5.08 cm.) thick.

The sipapu was 2 feet 4 inches (71.12 cm.) from the edge of the fire pit rim. It was 6 inches (15.24 cm.) in diameter and had a depth of 10 inches (25.4 cm.). The holes for the loom poles averaged 3 inches (7.62 cm.) in diameter and 10 inches (25.4 cm.) in depth. The storage hole at the base of the wall near the ventilator was 4 inches (10.16 cm.) in diameter and 6 inches (15.24 cm.) deep. The holes for the reinforcing posts in the wall near the ventilator were 4 and 6 inches (10.16 and 15.24 cm.) in diameter. They were 8 inches (20.32 cm.) deep. The poles had risen to a height of 2 feet 6 inches (76.2 cm.) above the floor.

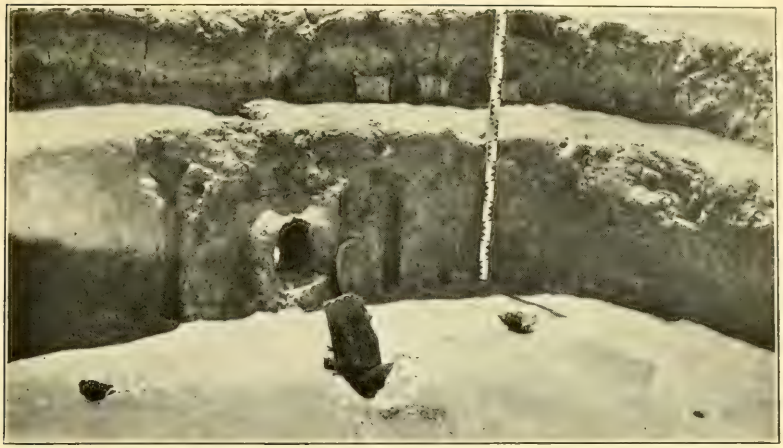
The rectangular shaped depression in the floor at the south side of the room was 2 feet 2 inches (66 cm.) long and 1 foot 5 inches (43.18 cm.) wide. It was quite shallow, having a maximum depth of only 2 inches (5.08 cm.).

There was some variation in the size of the holes for the main support posts. That at the north was 9 inches (22.86 cm.) in diameter. The east and west holes were the same diameter, 10 inches (25.4 cm.). The one at the south was the largest. It measured 1 foot (30.48 cm.) across. There was an even greater range in their distances from the wall. The north post was 2 feet (60.96 cm.), the south 1 foot 10 inches (55.88 cm.), the east 2 feet 6 inches (76.2 cm.), and the west only 1 foot 3 inches (38.1 cm.). Their depths ranged from 2 feet (60.96 cm.) to 2 feet 6 inches (76.2 cm.).

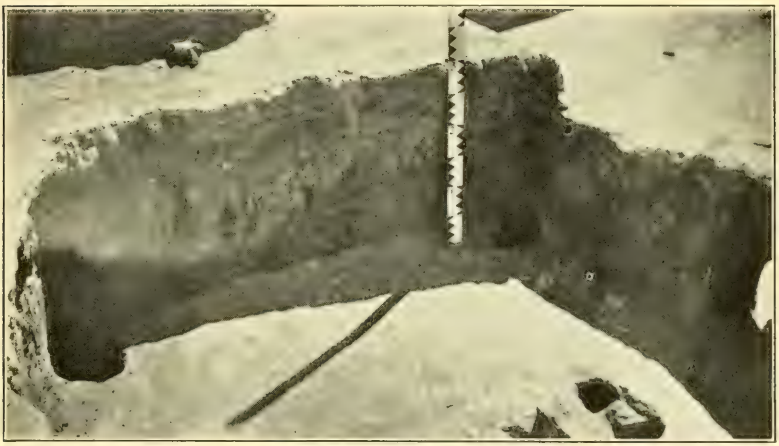
The plaster "apron" of the ventilator had a total width of 2 feet 3 inches (68.58 cm.), a height of 2 feet 6 inches (76.2 cm.), and a 9 inch (22.86 cm.) thickness at the bottom. At the top it merged into the front of the wall. The opening was 1 foot (30.48 cm.) wide, 1 foot 2 inches (35.56 cm.) high. The stone slab used to cover the hole was oval in shape. It had a length of 1 foot 11 inches (58.42 cm.), a width of 1 foot 5 inches (43.18 cm.), and was 1 inch (2.54 cm.) thick.

Inside of the "apron" the ventilator tunnel was 1 foot 6 inches (45.72 cm.) wide and 1 foot 10 inches (55.88 cm.) high. The tunnel was 4 feet 9 inches (1.447 m.) long. At the shaft end it had a height of 2 feet 6 inches (76.2 cm.). The shaft diameter on the tunnel line was 3 feet 6 inches (1.066 m.) and at right angles to it measured 2 feet 11 inches (88.9 cm.). The bottom of the shaft was 5 feet (1.524 m.) below the ground level.

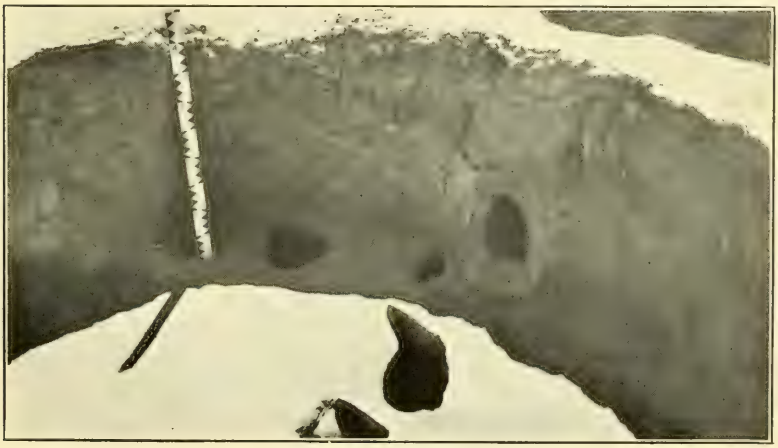
The next house in the group, house C, was the smallest and simplest of the four. Its pit approached the rectangular in shape. (Pl. 4, *b*.) The bench occurred on three sides only, the fourth being that where the wattle screen was used to shut it off from house B. The dwelling differed from the others in that the main support posts for the superstructure were set in the corners of the room. As a matter of fact some of them were partially incorporated in the walls. This would be of decided advantage from the standpoint of added floor space, especially in a structure as small as house C. The benefits of such a position for the main support posts were no doubt appreciated by the people of that period. A widespread adoption of the practice, however, was probably checked to some extent by the material available. In the larger structures such a method of building would have necessitated a considerable increase in the length of the stringers on top of the main posts. Inasmuch as the region is mainly a cedar country it would have been extremely difficult to secure suitable timbers more than 10 or 12 feet (3.048 or 3.657 m.) long. As a matter of fact it appears that approximately maximum timber lengths were used in all of the



a. House B, Group 1



b. House C, Group 1

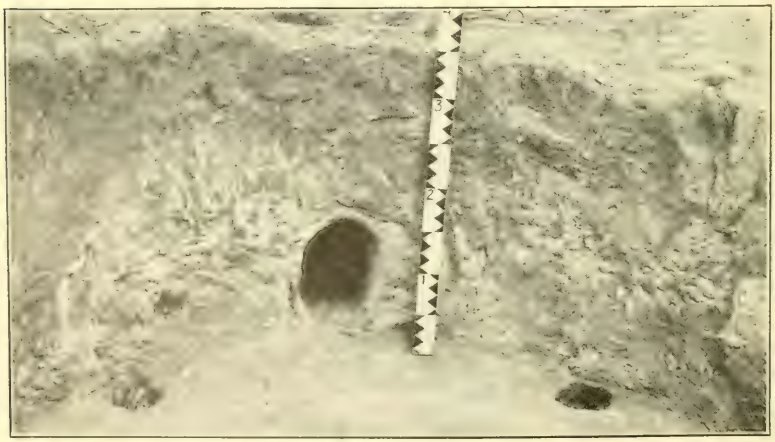


c. House D, Group 1

HOUSE REMAINS

a. House B, Group 2

b. House C, Group 2



c. House B, Group 3

HOUSE REMAINS

houses. Regardless of the size of the pit there was no great variation in the distance between the main support posts. Since it is very probable that the length of the stringers did not greatly exceed that of the space between the posts a close estimate of their measurements may be made. On this basis it can be said that the beams ranged from 7 feet 6 inches (2.286 m.) to 10 feet 6 inches (3.2 m.) in length. This would be a good average for suitable cedar logs.

The remainder of the superstructure, as far as could be judged from the available evidence, was typical in its features. The only variation from the characteristic form was the treatment on the side where houses B and C came together. This was discussed at some length in the consideration of the house B superstructure and further comment is not necessary.

The fire pit in house C was simpler in form than the two previously described. It was a mere saucer-shaped depression in the floor. There was no encircling rim of plaster. The stone separating the fire pit from the ladder box differed from those in the other structures in that it rose some distance above the floor level and served as the deflector.

The ladder box was trapezoidal in form and also lacked the bordering ridge of adobe. The pit was of interest because it gave actual evidence of the use of a true ladder. The type which is generally supposed to have been in wide use in the prehistoric periods was the notched log variety. Curiously enough, however, it is almost impossible to find references to its presence in prehistoric ruins. This form is indicated in house B, Figure 3, where the abraded end of the ladder box suggested that a single large log had rested there rather than that two poles had been braced against the plaster. Runged ladders have been found in Pueblo III and later ruins,[38] but evidence that they were used in earlier periods has been lacking. Hence the indication that such was the type here employed is of significance in its demonstration of the early development of the feature.

The actual ladder was not present in house C, to be sure, but in the two holes at the corners of the pit were the decayed ends of the poles. The holes slanted at just the angle, 30° from the vertical, which the ladder would have required in order to pass over the fire pit to a hole in the roof above. The holes were not dug into the floor. After the ladder had been placed in position the end of the

[38] Fewkes, J. W., 1904, p. 134. Morris, E. H., 1928, fig. 22, b; p. 365. Nordenskiöld, G., 1893, p. 67. Nordenskiöld was inclined to think that the example which he found was not prehistoric because he detected marks on it which he attributed to a metal implement. Similar specimens from unmistakable horizons in other localities have subsequently established the antiquity of the form, and it is probable that the Mesa Verde ladder was of Indian origin and antedated the coming of the white man.

pit was filled in with adobe mud. The plaster dried around the butts and not only held the poles in place but formed the molds which record their former existence. The use of a runged ladder was also suggested in house D of the second group. This second bit of evidence strengthened the proof of the early development of a true ladder.

There is, of course, no way of knowing just how the runged ladders employed in the Long H houses were made. Those found in ruins of later date may be of the same type and again may differ. Since a utilitarian object of this kind is not subject to great changes, it is possible that the later forms retained many of the original characteristics. For this reason a description of more recent examples may serve to suggest how the ladders in house C, Group 1, and house D, Group 2, might have been constructed. The simplest form consisted of two poles with rungs lashed to the uprights. Another had notches in the vertical poles. The rungs were laid in these depressions and then lashed.[39] This type might well have been a direct outgrowth from the notched log form and the simple lashed rungs the ultimate development. Less work would be involved in making one of the latter, but the lashings would have to be more secure. The logical supposition would be that the simple form came first and the more complex later. The reverse, however, is more often the case in primitive cultures. There are many examples in various groups of manufactured objects where the old forms are complex and the later quite simple.

Another type of ladder found in Pueblo III ruins was one with sides of cedar or pine uprights with small poles, frequently willows, paralleling and attached to them. The rungs were fastened between the cedar and willow poles and rested upon the lashings which bound them together. The willow was occasionally long enough to serve both sides. Where such was the case it was not cut into two pieces but bent across from one side to the other at the top.

House C was consistent with the other structures in the presence of a sipapu. The hole was on the opposite side of the fire pit from the ventilator and at approximately the same distance from the pit as in the other houses. There were no additional holes such as might have been used for storage purposes or as pot rests. Except for the sipapu and various holes for posts, the floor was unbroken.

The ventilator in house C was unusually interesting, and as far as is known at the present time it is a unique example. It consisted of a hole through the wall between C and B. House B served as the shaft for the ventilator and no doubt was very effective in such a

[39] Mindeleff, V., 1891, pp. 158–159.

capacity. Both ends of the short tunnel through the wall were carefully finished. Where it opened into house C the wall was rounded off and there was a slight offset to hold a stone in position in front of the opening. The edges of the B end of the tunnel were abruptly rounded. The aperture might have served as a passage between the two rooms for children or dogs, but not for adults. There was no question but what it primarily was a ventilator.

The method of providing for that feature in house C suggests several sidelights on the character of the builders. It would have been practicable and comparatively easy to construct a ventilator on one of the other sides of the house and have it open to the outside air. The other walls, however, were in the wrong direction. The ventilator is very consistent in its eastern or southeastern placement and this no doubt had some bearing on the problem. From the standpoint of labor involved, the form used entailed, by all odds, a minimum of effort. It is not likely, though, that such a consideration weighed heavily on the minds of the workmen. Custom takes precedence in such a case, and in this instance it was just their good fortune that the proper location for a ventilator was the easiest one in which to place it. That they were willing to have such an opening between the two chambers shows that the question of family privacy was of little moment. Certainly what went on in one room would be known to the occupants of the other under such conditions. But the whole Pueblo outlook is, and probably was, so essentially communal that such minor matters would cause no concern.

During the course of the excavations in the two houses it was at first thought that C might have been built and occupied subsequent to the abandonment of B. Under such circumstances the question of the upper wall of wattlework and the ventilator of the one opening into the other would have been of little consequence. As work progressed, however, and all of the factors involved were studied it became more and more apparent that they were contemporaneous. Not only was this true, but in addition there was evidence to suggest that they probably were vacated at the same time. The abandonment may be attributed to the partial destruction of the superstructure by fire. That the covering of C was largely consumed was shown by the 1½-inch (3.81 cm.) layer of charcoal lying on the floor. In the large room remains of burned roofing covered the area between the support posts and the wall on that side. Inasmuch as the charred material in both chambers was lying directly on the floor, there can be no question but what the houses were destroyed during occupancy. That the remains of the roofing occupied a similar position in both structures is good evidence for their

contemporaneity. Furthermore, in the fill of house C there was a layer of water-streaked sand 9 inches (22.86 cm.) above the floor. The débris in the room showed clearly that after the roof of the dwelling had fallen in, sand and ash had been blown into the pit and then, due to rain or snow, water had collected and stood there. The line of water-streaked sand extended across the room of C and through the ventilator opening and into the débris in house B. The latter shows distinctly that the pits had stood open and were filled at approximately the same time, which is additional proof of their having been contemporaneous.

The destruction of one house and a part of the other was not the only misfortune which befell the occupants. Tragedy accompanied the flames and two members of the household perished in them. Lying on the floor of house C with the head partially in the ventilator opening were the charred remains of a woman. Little was left but the cranium and fragments from some of the long bones. The back and one side of the skull were burned until only the paper-thin inner surface of the bone remained. The flames had been so hot that the body was largely consumed. The position of the bones and skull suggested that the woman had tried to crawl out of the structure through the ventilator into B, but had been overcome before she could make her escape. The remains of the other individual, a child nearing the age of adolescence, were against the wall at the south side of the ventilator. The skull, a few ribs, vertebræ, and fragments from the long bones were present. All bore traces of burning.

There is no way of knowing whether the fire which destroyed the dwellings and the lives of two of the occupants was of accidental origin or whether it was intentionally set. It is possible that it was accidental, because a roof of the type which covered these pit rooms would offer abundant opportunity for vagrant sparks to lodge in the brush and reed ceilings and start a conflagration. On the other hand, there unquestionably were many instances when houses were put to the torch by enemies. Examples have been found where whole villages were destroyed in that manner.

House C measured 8 feet 6 inches (2.59 m.) inside the bench on the ventilator line. Above the bench on the same diameter it was 12 feet 5 inches (3.784 m.). The diameters at right angles to the above line were 9 feet 9 inches (2.971 m.) inside the bench and 13 feet 9 inches (4.191 m.) above it. The average depth of the pit was 6 feet (1.828 m.). The top of the bench was 3 feet 4 inches (1.016 m.) above the floor. The width of the bench ranged from 1 foot 8 inches (50.8 cm.) to 2 feet 10 inches (86.36 cm.).

The fire pit had diameters of 1 foot 1 inch (33.02 cm.) and 1 foot 2 inches (35.56 cm.). Its depth was 6 inches (15.24 cm.).

The ladder box measured 1 foot 3 inches (38.1 cm.) on the ventilator line. The side nearest to the ventilator opening was 1 foot 8 inches (50.8 cm.) long and that near the fire pit 1 foot (30.48 cm.). Its greatest depth was 6 inches (15.24 cm.). The holes in the plaster where the ladder poles had rested were oval in form. Their diameters ranged from 4 to 6 inches (10.16 to 15.24 cm.). Their depth was similar to that of the box, 6 inches (15.24 cm.).

The deflector, which in this house was between the fire pit and the ladder box, had risen to a height of 1 foot 3 inches (38.1 cm.) above the floor. It was 11 inches (27.94 cm.) wide and 1½ inches (3.81 cm.) thick. When the house was excavated the stone was found lying in the fire pit. Although broken, all of the pieces were present and it was a simple matter to determine what the measurements had been.

The sipapu was 1 foot 3 inches (38.1 cm.) from the fire pit. It had a diameter of 4 inches (10.16 cm.) and a depth of 7 inches (17.78 cm.). The holes for the main support posts ranged from 6 to 8 inches (15.24 to 20.32 cm.) in diameter. Their depths averaged 2 feet (60.96 cm.).

The ventilator opening was 1 foot (30.48 cm.) high and 10 inches (25.4 cm.) wide. The sill was 2 inches (5.08 cm.) above the floor of house C, and at the opposite end 5 inches (12.7 cm.) above the floor of house B. The tunnel was very short. Its maximum length was 1 foot 5 inches (43.18 cm.) and its shorter side measured only 10 inches (25.4 cm.). There was, of course, no shaft.

House D was another good example of a typical pit house. (Fig. 1; pl. 4, *c*.) In all of its features it represented a normal dwelling of the fully developed form. The pit was roughly circular in outline, and was encircled by a bench. The main difference between this part of the D structure and that of the A house, which it closely resembled, was the depth of the pit. The subterranean portion of house D was the deepest in the group of four dwellings.

The superstructure probably was of the characteristic type. Presumably the only difference between it and the covering of house A was in the overlapping of the small section of the house B side poles. The latter feature was not, strictly speaking, a part of house D but an extraneous factor. That a small portion of the sloping upper wall on the northeast side of the room had served as a foundation for a section of the house B walls probably had no bearing on the inherent nature of D. As in the other structures, the upper framework in this house had been supported on four upright posts set in the floor. In two of the holes the decayed ends of the original posts were still in place.

The fire pit near the center of house D was of the characteristic type. It approached the circular form and in cross section was more bowl shaped than some of the others. (Fig. 2.) As noted in both A and B, the pit was bordered by a plaster rim rising several inches above the floor. This ridge of adobe also inclosed the contiguous ladder pit. The latter, like the fire pit, was fairly circular in contour. In this it differed from the other three which were quadrilateral in form. Between the two pits was a slab of stone which reinforced the ridge of plaster separating them. This stone was more pronounced than the one in A, due to the fact that its top was some inches above the upper surface of the ridge. (Pl. 4, *c*.) The bottom of the ladder pit showed distinctly the impression of the butt end of a single large log. Consequently there is little question but what the ladder used here was of the solitary notched pole variety.

Embedded in the plaster ridge which bordered the fire and ladder pits was an upright slab of stone. This was the deflector. It was placed between the ventilator opening and the ladder pit in just the proper position to divert the current of air coming in through the aperture. The ventilator here was particularly efficacious, even in the unroofed state of the pit, as at all times during the summer one could distinctly feel the air entering the chamber through the opening. As a matter of fact, the draft was generally strong enough to waft the smoke from a pipe or cigarette to the opposite side of the room.

House D had a sipapu in the proper place on the customary side of the room. In addition, however, there were two slightly smaller holes in the floor placed nearer the fire pit, approximately equidistant from the sipapu. (Fig. 1, house D, *e*.) The three holes formed a triangle at that side of the fire pit. The two smaller ones were as carefully finished as the sipapu. They may have served as containers for small objects, such as bone awls, spindle shafts, etc., but there was nothing to indicate that such was their function. Also, it is quite possible that they may have had some connection with the sipapu and thus have had ceremonial significance. However, what their real purpose may have been could not be determined.

The large hole in the floor near the ventilator opening was a storage place. Several bone awls and a number of small, smooth stones, possibly for polishing the surfaces of pottery vessels during the process of their manufacture, were found in it. Another storage place took the form of a subwall recess similar to that in house A, although its location was different. (Fig. 1, house D, *h*; pl. 4, *c*.) The one in A was associated with the south support post while that in D was near the eastern pillar. The bottom of the recess extended back

into the face of the bench to a greater extent than the one in house A did, but in general the characteristics of the two were quite alike. At the south edge of the depression there was a hole in the floor which seemed to have contained a small pole. The latter might have served a number of purposes, but there was nothing to indicate for what it was intended.

The opening of the ventilator tunnel in house D had been augmented and slightly reduced by the modeling of a small adobe "apron" about the aperture. This feature was similar to that in house B but not as pronounced as the latter, since it was largely confined to the lower part of the opening. At about the top of the tunnel the "apron" fused with the wall of the room. The sill of the opening was slightly grooved in order to hold a small stone covering slab. The tunnel portion of the ventilator differed from that in A and B. It was not constructed in the same way. The procedure in this dwelling had been like that in some of the simpler structures of Groups 2 and 3, namely, the horizontal passage was actually tunneled through the earth. There was a considerable upward slant to the passage from the opening into the room to the bottom of the shaft. The latter was oval in contour with its long diameter at right angles to the line of the tunnel.

The diameter of house D inside the bench on the line of the sipapu, fire pit, and ventilator was 10 feet 9 inches (3.276 m.). Above the bench it measured 14 feet 8 inches (4.47 m.). The diameters at right angles to this line were 12 feet 2 inches (3.708 m.) inside the bench and 17 feet (5.181 m.) above it. The depth of the pit ranged from 7 feet 9 inches (2.362 m.) to 8 feet 2 inches (2.489 m.). The bench top was from 3 feet 10 inches (1.168 m.) to 4 feet (1.219 m.) above the floor. The width of the bench ranged from 1 foot 10 inches (55.88 cm.) above the ventilator to 2 feet 9 inches (83.82 cm.) at the side of the room near house B.

The fire pit varied from 1 foot 1 inch (33.02 cm.) to 1 foot 2½ inches (36.83 cm.) in diameter. Its bottom was 9 inches (22.86 cm.) below the floor level. With the added 3 inches (7.62 cm.) of the adobe rim its total depth was 1 foot (30.48 cm.). The ladder pit was somewhat irregular in outline, but it measured 1 foot 1 inch (33.02 cm.) on cross diameters. It was much shallower than the fire pit, the bottom being but 3 inches (7.62 cm.) below the floor line. The added depth due to the plaster ridge made a total of 6 inches (15.24 cm.). The inclosing adobe ridge which encircled both pits had an average width of 5 inches (12.7 cm.). The stone slab separating the two pits extended 3 inches (7.62 cm.) above the top of the ridge in which it was set. The slab was 1 foot (30.48 cm.) wide and 1 inch (2.54 cm.) thick. The deflector stone had a height

of 1 foot 6 inches (45.72 cm.). It was 1 foot 1 inch (33.02 cm.) in width and had a thickness of 1½ inches (3.81 cm.).

The sipapu was 1 foot 2 inches (35.56 cm.) from the edge of the fire-pit rim. The hole was approximately circular with a diameter of 4 inches (10.16 cm.). Its depth was 9 inches (22.86 cm.). The two small holes adjacent to it had slightly different sizes. That to the east was 10 inches (25.4 cm.) from the sipapu. It had a diameter of 2½ inches (6.35 cm.) and a depth of 6 inches (15.24 cm.). The hole to the southwest was 1 foot 4 inches (40.64 cm.) from the sipapu. The diameter was 3 inches (7.62 cm.) and the depth 5 inches (12.7 cm.). The storage hole near the ventilator had a diameter of 6 inches (15.24 cm.) and a depth of 5 inches (12.7 cm.). The small hole near the subwall recess was 2½ inches (6.35 cm.) in diameter and 6 inches (15.24 cm.) deep.

The holes for the support posts ranged from 9 inches (22.86 cm.) to 1 foot 2 inches (35.56 cm.) in diameter. The east post had been placed within 2 inches (5.08 cm.) of the wall, while the west one was 1 foot (30.48 cm.) away from it. The south pole was 3 inches (7.62 cm.) and the north 6 inches (15.24 cm.) in from the face of the bench. The average depth of the holes was 2 feet 6 inches (76.2 cm.).

The storage recess in the wall near the east support post measured 1 foot 7 inches (48.26 cm.) by 1 foot 9 inches (53.34 cm.) on the floor level. It extended into the face of the bench 7 inches (17.78 cm.). The bottom of the depression was 2 inches (5.08 cm.) below the floor of the room. The top of the recess was 1 foot 4 inches (40.64 cm.) above the floor and 1 foot 6 inches (45.72 cm.) above the bottom of the recess.

The ventilator opening was 9 inches (22.86 cm.) wide and 1 foot 6 inches (45.72 cm.) high. The lower part of the "apron" projected into the room 6 inches (15.24 cm.) from the face of the bench. The sill of the aperture was 3 inches (7.62 cm.) above the floor. The tunnel was 3 feet 6 inches (1.066 m.) long. At the shaft end it had a height of 1 foot 10 inches (55.88 cm.) and a width of 1 foot (30.48 cm.). The shaft was 3 feet (91.44 cm.) in diameter at right angles to the tunnel and 2 feet 6 inches (76.2 cm.) across on the passage line. The bottom of the shaft was 6 feet 1½ inches (1.866 m.) below the surface of the ground.

Group No. 1 had seven storage pits associated with the house cluster, although only one of them is shown in the plan. (Fig. 1.) The others were a little too far removed from the dwellings to be included in a plat drawn to the scale used in the diagram which accompanies this report. They were located in an irregular group 50 feet (15.24 m.) east of the houses. These pits were all that remained

of former granaries. The latter, like the houses, had consisted of excavations covered with pole, brush, and plaster roofs. The débris filling two of the pits contained large fragments of plaster bearing the imprints of poles and brush. Others gave evidence of slanting side poles.

There were no benches in the storage pits and as a consequence the superstructure poles sloped from the ground level around the edges of the holes. Where the bench of the house kept the slanting sides from sliding out of position the same end was accomplished in these structures by placing the lower ends of the poles in shallow depressions or holes. The superstructure of the granaries also differed from those in the houses in the lack of interior support posts. The probabilities are that portions of the framework were heavy enough to carry the weight of the superstructure without additional support. These coverings were very likely conical rather than truncated in form.

There is nothing at the present time to show just how the upper portion of the granaries was erected but it is possible that the method used may have been similar to that employed by the Navajo in their sweat houses. In the construction of such huts a framework consisting of three boughs is erected. The timbers used have forked upper ends which are interlocked in such a fashion that the tripod formed by spreading their lower extremities is capable of supporting considerable weight. Two straight sticks placed against the apex provide for a narrow entrance. Numerous other sticks, brush, and reeds complete the framework, which is then covered with earth.[40] By building such a covering over a pit, a storehouse of considerable utility could be provided. The use of plaster on the exterior of the framework would make the roofing practically waterproof. The plaster on the walls of the pit would keep moisture from seeping into the subterranean portion, so that the interior of the structure would be perfectly suitable for the storage of corn or other products. At the time of excavation one of the pits was almost half filled with carbonized corn on the cob.

As far as could be judged from available evidence, the storage places were quite similar in their characteristics. The main difference was in the size and depth of the pits. In diameter they ranged from 3 feet 6 inches (1.066 m.) to 6 feet 6 inches (1.981 m.). Their depths varied from 1 foot 5 inches (43.18 cm.) to 4 feet (1.219 m.), although most of them approximated 3 feet (91.44 cm.).

A number of the pits in the various house groups had been put to a secondary use and were employed as burial places. This prac-

[40] Mindeleff, C., 1898, pp. 499–500.

tice was quite common in the Basket Maker periods and carried over to some extent into the early Pueblo horizons. From observations on the custom made at various sites where the feature has been found, it would seem that the general method of disposing of the dead was to place the body in an empty granary or one which had fallen into disrepair. If none was available a grave was dug in the refuse heap of the village. The use of the pits for such a purpose was probably a question of expediency and not one of ceremonial significance.

Two of the exterior surface fire pits are shown in Figure 1. In addition, there were four more in the area east of the houses. They were of two types. One form was a simple plastered pit, while the other was lined with stone slabs. The stones used were frequently worn-out metates or milling stones. The size range of the fire pits was not very great. The diameters consistently fell within the limits of 2 feet and 2 feet 6 inches (60.96 and 76.2 cm.). The depths varied from 1 foot to 1 foot 6 inches (30.48 to 45.72 cm.).

The use of outdoor fire pits was a common practice throughout the numerous periods in the sequence of southwestern sedentary cultures. It appears, however, to have been more pronounced in the earlier horizons. This was undoubtedly due to the fact that the people spent as much time as possible in the open. They did not live in houses in the sense which present-day usage of the term implies. The dwellings no doubt served as shelters when the weather was inclement and probably were occupied quite continuously during the winter months when cold winds swept the barren tablelands. When conditions were more propitious they possibly served only as sleeping quarters and places for the storage of family and personal possessions. Much of the cooking must have been done in the open. Indications that brush arbors were erected over the outside fire pits are often found in such villages. This would tend to show that the ancients, like many of their descendants, must have performed many of the so-called household tasks in the open. At the present time the Pueblo Indians will spend most of the summer months under just such shelters.

The refuse mound for the group of houses was located due east of structures A and B. It was somewhat oval in contour and covered a comparatively large area. The depth was not great, but the contents were very compact. This would indicate that the mound had undergone a marked settling and compression during the long period intervening between its abandonment and the time of the 1929 investigations.

The contents of the refuse pile consisted of ashes, charcoal, broken bones, potsherds, stone chips, broken stone implements, broken shell

beads, bits of bracelets, and sand. In fact anything of an imperishable nature which had found its way into the village and then was discarded. Originally the refuse no doubt contained considerable animal and vegetable matter, but all of that had disappeared. In addition to having been the dump the mound had also served as a cemetery. Ten interments were found scattered at various parts of the mound. Since the latter will be considered under the general heading of burials they need not be discussed in this section of the report.

GROUP NO. 2

The second cluster of houses was located 100 feet (30.48 m.) southwest from Group 1. It consisted of the remains of 5 dwellings, 1 storage pit, 2 exterior fire pits, and a refuse mound. There was a noticeable difference between this group and the preceding one from the standpoint of house positions. Each structure stood alone at some distance from the others. Furthermore, three of the dwellings were much smaller than the structures of Group 1. Their pits were not as deep and in two instances no encircling bench was present. One of the houses had never been brought to completion. The pit portion constituted all that had been done toward its erection when for some reason work was abandoned.

House A of Group 2 (fig. 5) had a pit with curved walls, but it could be considered neither circular or oval in form. The walls met in such a fashion as to form perceptible, although not well-defined, corners. No evidence whatsoever of the former existence of a bench could be found around the upper edge of the pit. Inasmuch as a similar condition was observed in other structures it seems very probable that it never did have a bench.

The superstructure over the pit had been supported on four main posts. The latter were set quite close to the wall, in one instance actually touching it. There were no traces of sloping side poles. The lower ends of the latter probably had been placed on the ground around the subterranean portion of the dwelling, the tops resting against the rectangular framework on the four posts. The slant, in all likelihood, was not as pronounced as that in the structures with encircling bench. The superstructure probably extended to a greater height above the surface level as the pit was much shallower than those in the houses of Group 1. For this reason the side poles would have been more nearly vertical.

The interior furnishings of the domicile had been simple in the extreme. The only observable features were the shallow, saucer-shaped fire pit in approximately the center of the room and, near by, the sipapu. There were no storage holes, no ladder pit, not even a trace of a deflector. There was a very slight depression in the floor

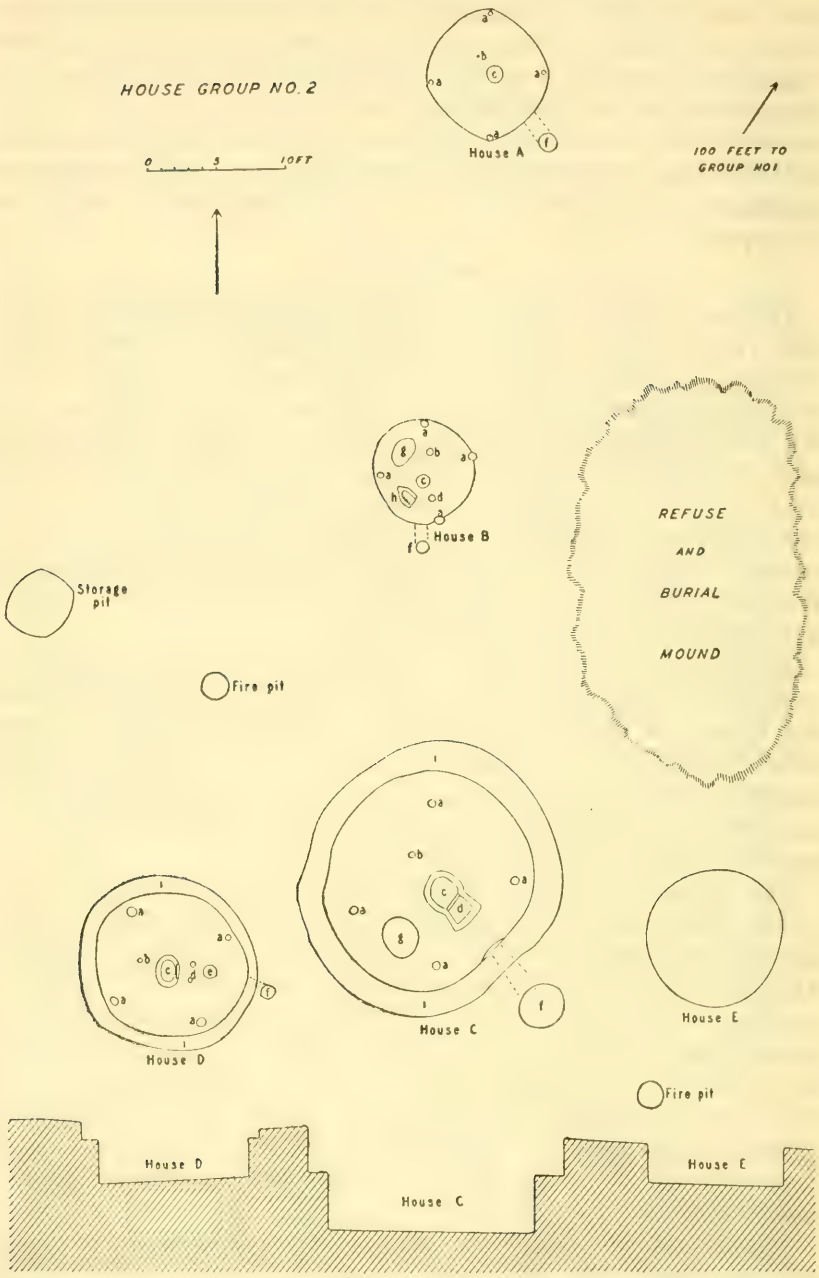


FIGURE 5.—Plan of House Group No. 2: *a*, Holes for main support posts; *b*, sipapus; *c*, fire pits; *d*, ladder pits; *e*, depression in floor; *f*, ventilator shafts; *g*, oval depressions in floors; *h*, metate or milling stone; *i*, benches

at the southeast side of the fire pit. This may have marked the position where the base end of a ladder might have rested, but it was far from distinct and there was no assurance that such a function could be attributed to it.

The ventilator was not at all elaborate. A short tunnel had been dug into the earth at the southeast side of the chamber to form the horizontal passage. At its outer end was a small circular hole forming the vertical shaft. The opening into the room had not been augmented by the use of plaster nor was there any reduction in the size of the tunnel mouth.

House A measured 8 feet 6 inches (2.59 m.) across the pit on the sipapu, fire pit, ventilator line. At right angles to the above it was 8 feet 3 inches (2.514 m.) from wall to wall. The pit was only 3 feet 3 inches (99.06 cm.) in depth.

The fire pit was fairly circular in form with a diameter of 1 foot 3 inches (38.1 cm.). It was very shallow and at its deepest part the bottom was only 3 inches (7.62 cm.) below the level of the floor. There was no encircling ridge of adobe.

The sipapu was 1 foot (30.48 cm.) from the edge of the fire pit. The hole was not as large as those noted in the houses of the first group. Its diameter was only 2 inches (5.08 cm.) and its depth 4 inches (10.16 cm.).

Holes for the support posts ranged between 4 inches (10.16 cm.) and 6 inches (15.24 cm.) in diameter. The depth averaged 2 feet (60.96 cm.). The north and west poles were 2 inches (5.08 cm.) from the walls. The east support was set into the room 3 inches (7.62 cm.), while the south pole was placed in the corner and actually touched the sides of the pit.

The opening into the ventilator tunnel was 10 inches (25.4 cm.) wide and 11 inches (27.94 cm.) high. The tunnel was 1 foot 7 inches (48.26 cm.) long. Where it entered the shaft it had a width of 1 foot 2 inches (35.56 cm.) and was 1 foot 4 inches (40.64 cm.) high. The shaft was nearly circular in form and had a diameter of 1 foot 3 inches (38.1 cm.). The bottom was 3 feet (91.44 cm.) below the surface of the ground.

House B was one of the most interesting of the small structures. Fire had destroyed it and practically everything used in the daily life of the people which was of an indestructible nature was found on the floor when the débris was removed from the pit. The excavation for the subterranean portion of the structure was oval in outline and, like the first of this group, quite shallow. There was no encircling bench around the upper part of the pit. (Fig. 5.)

The superstructure of the dwelling had probably been like that described for A. As a matter of fact it would be more correct to

state that the covering over the A pit may have been similar to the upper part of house B. The latter can be described with a fair degree of accuracy because many of the half-burned timbers from it were lying in the pit. The positions which these charred pieces of wood occupied in the fill demonstrated rather clearly the manner in which they had been placed in the superstructure. In accordance with the usual practice, four upright timbers supported the framework. Two of these posts were set into the wall, one touched it, and the other was a few inches removed from it. The side wall poles were placed around the edge of the pit on the ground level. Their butts were not embedded in the earth but rested on it. This was unmistakably established by the charcoal remains. The upper ends leaned against the framework on the main posts. Judging from the position of the supports, two sides of the superstructure must have had almost vertical walls. The other two had a fairly marked slant. The portion of the roof within the square formed by the four posts was probably flat.

The interior features of the remains of this dwelling were gratifying from the standpoint of additional information on the question of arrangement. The fire pit was near the center of the chamber, in accordance with the general plan found in all of the houses. It was just a simple shallow pit without a bordering rim. When the débris was cleared from the house it was found that the fire pit was practically filled with wood ashes. This suggested that it had been in use a short time prior to the disaster which befell the structure.

There was no ladder pit in the room comparable to the well-finished depressions noted in the Group 1 structures, but in approximately the position which such a feature would have occupied there was a hole in the floor. The latter contained the decayed and charred end of a log which unquestionably was all that remained of the ladder, a notched pole. The base end had been firmly embedded in the floor. When the fragments of wood were removed from the hole it was found that there had been just the right degree of slant for a pole to pass over the fire pit to an opening in the roof above it. Embedding the lower end of the ladder in the floor would be even more effective than a regular pit and in addition would not intrude to so great an extent on the already limited floor space of the room.

The sipapu was a little farther from the fire pit than in most of the small structures and it was somewhat larger as well. The due north position also was rather unusual. However, the whole sipapu, fire pit, ventilator complex was on a more nearly north-south line in this dwelling than is generally found to be the case.

Between the north and west support posts was a large, roughly oval pit in the floor. This basin practically filled that side of the room, very materially reducing the floor space. When the house was cleared of débris pieces of a large culinary jar were found in this depression. The vessel had apparently been standing in the basin when the superstructure fell and crushed it. There were no other provisions for the storing of objects, but one such pit was no doubt sufficient.

One of the most pleasing features in the house was that of the metate or milling stone which stood in position near the fire pit. (Pl. 5, *a*.) The stone was of the flat, open-end type which is characteristic of the early periods. It rested on three smaller rocks which raised it several inches above the floor. Two of the supporting blocks were under the front corners and the third was at the rear. One of the manos or hand stones used in grinding the grain was resting on the upper end of the metate, just above the groove or trough. On the floor in a neat pile at one end of the metate, between it and the wall, were two additional manos and two pecking stones. The latter were used in roughening the grinding surface of the groove when the metate had become too smooth to effectively pulverize the corn. The manos were enlightening in that they, including the one on the stone, formed a graded series. Their surfaces ranged from coarse to fine. From this it may be deduced that the manner of milling was similar to that of the modern Indians in the area. The general practice in grinding corn is to begin with a coarse stone and then proceed to finer and finer ones until the desired quality of meal is obtained. Some of the prehistoric people in later periods had bins with a series of three metates of varying degrees of roughness, a feature also found in some of the modern villages. In this early horizon, however, a single nether stone seems to have sufficed. None of the houses at the Long H had mealing bins and it is likely that the metates in all of them were set in positions similar to the present example.

The ventilator for house B was very simple in form. It had a short, small horizontal passage tunneled through the earth at that side of the dwelling. (Pl. 5, *a*.) The shaft at the outer end was just a small, irregular-shaped hole in the ground. There were no indications that either shaft or tunnel had been plastered. The natural earth sides had been sufficient. The simplicity of this ventilator is not to be attributed to its having been a rudimentary form. Rather, it is to be considered as a degenerate example. As previously mentioned, the ventilator was an outgrowth from what originally was the entrance to the house. Consequently the small incon-

spicuous openings which could have served only as ventilators represent the culmination and not the beginning of the feature.

House B measured 7 feet 6 inches (2.286 m.) from wall to wall on the line of the ventilator, fire pit, and sipapu. On the diameter at right angles to the former the distance between walls was 7 feet 3 inches (2.209 m.). The depth of the pit varied from side to side. This was due to the fact that it was dug into sloping ground. The surface fell away to some extent at the southeast side. On the north edge of the room the floor was 2 feet 9 inches (83.82 cm.) below the ground. At the south side, near the ventilator, it was 2 feet 8 inches (81.28 cm.). The west wall was the highest and along that side the floor was 3 feet (91.44 cm.) below the surface. The east floor had a depth of only 2 feet 6 inches (76.2 cm.).

The fire pit had a diameter of 1 foot (30.48 cm.) and a depth of 3 inches (7.62 cm.). The sipapu was 1 foot 6 inches (45.72 cm.) from the fire pit. It had a diameter of 6 inches (15.24 cm.) and a depth of 8 inches (20.32 cm.). The storage basin at the northwest side of the room was 2 feet 3 inches (68.58 cm.) long, 1 foot 6 inches (45.72 cm.) wide, and 4 inches (10.16 cm.) deep. The hole in which the ladder post was embedded had a diameter of 7 inches (17.78 cm.) and a depth of 8 inches (20.32 cm.). The holes for the main support posts ranged from 4 to 7 inches (10.16 to 17.78 cm.) in diameter and were 2 feet (60.96 cm.) deep.

The ventilator was 8 inches (20.32 cm.) wide and 1 foot (30.48 cm.) high where it opened into the room. The tunnel was 1 foot 4 inches (40.64 cm.) long. The shaft at the outer end had a diameter of 6 inches (15.24 cm.) and its bottom was 2 feet (60.96 cm.) below the ground level.

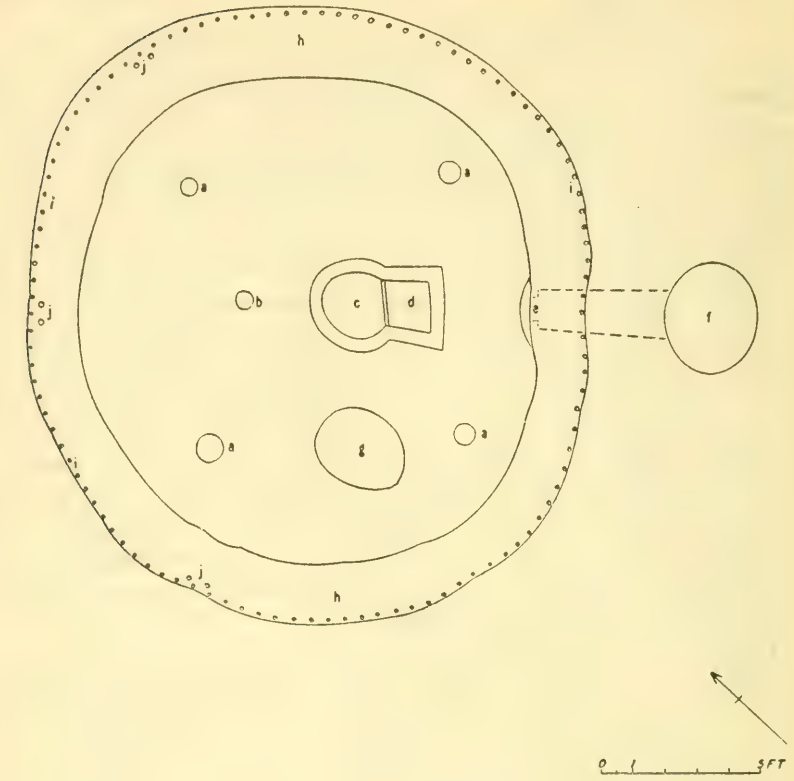
House C was the largest in the second group and taken as a whole was quite similar to the dwellings of the first cluster. (Pl. 5, *b*.) There were some minor variations, however, which were of interest in that they showed a somewhat different method of construction. Although it had some irregularities, the pit was fairly circular in form. (Fig. 5.) This was not due entirely to the manner in which the original excavation was made, but may be attributed in part to a secondary construction. House C did not have the same type of bench as that previously described. This feature of the structure was not the result of digging but of building up. When the pit portion of the dwelling was dug no provision was made for a bench. The walls of the excavation went straight down to the floor. The bench was then constructed by the erection of an adobe wall at some distance from the sides of the pit. The space between was filled with ashes, sand, broken stones, and earth. The top of this fill was covered with a thick coat of plaster and to all outward appearances

the bench was like those in the other structures where they were formed by digging.

The superstructure of house C had been destroyed but not completely consumed by fire. Considerable remained of the timbers and the covering which had been placed over them. As a consequence a good idea of the exact character of the roof was obtained. There were certain features which were peculiar to this particular structure. The heavy, main framework had been supported by four upright posts set in the floor in the customary manner. The main stringers which formed the rectangular framework on top of these posts were fairly good-sized logs averaging 6 inches (15.24 cm.) in diameter. The charred remains lying on the floor showed clearly that the beams parallel to the sipapu, fire pit, and ventilator line had rested in the forks at the upper ends of the supporting posts. The other large stringers had in turn been placed on top of those reposing in the crotches. A series of smaller poles, running parallel to the heavy logs lying in the forks of the uprights and resting on top of the other two stringers, extended across the rectangular space formed by the four large logs. The smaller poles were covered with large quantities of reeds and cedar leaves. The layer of plaster which finished off the roof was 6 inches (15.24 cm.) thick.

The question of the side portions of the superstructure presents something of a problem. There were some indications that they might have extended from the ground level instead of from the top of the bench. This was suggested by the fact that the back wall above the bench had been faced with a lining of poles intertwined with reeds and covered with plaster. These poles were embedded in the top of the bench in an upright position and extended completely around the periphery. Even where the charred ends of the timbers were not present they were indicated by holes where they had stood. (Fig. 6.)

First thoughts were that the rear wall had been so treated because the roof had been built from the ground level. Under such conditions it would be logical to suppose that the builders had decided that the upper portion of the pit should be carefully finished in order that it might conform to the well-plastered lower walls. At three different points on top of the bench, however, there were additional holes in front of those where the vertical poles had been set. Two of these still had the charred remains of small timbers in them and in both instances there was a slant of 46° from the vertical. The additional holes showed approximately the same angle, which is about the slope which a series of poles extending from the back of the bench to the rectangular framework on the main supports would take. This would give a superstructure with side walls of



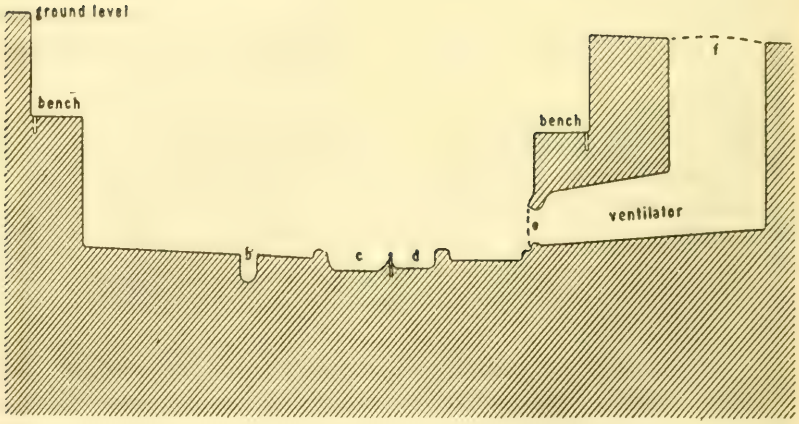


FIGURE 6.—Plan of House C, Group No. 2; *a*, Holes for main support posts; *b*, sipapu; *c*, fire pit; *d*, ladder pit; *e*, ventilator opening; *f*, ventilator shaft; *g*, oval depression in floor; *h*, bench; *i*, holes for upright poles forming wainscoting at back of bench; *j*, holes where slanting roof poles rested

the type described for the other houses. From this evidence it would seem that such a form was present in house C. Since only a few of the side timbers were set into the bench, the remainder must simply have rested in the angle formed by the top of the bench and the pole and plaster wall.

Granting that the superstructure had been of the general type with side walls sloping from the bench, it becomes difficult to explain the rear wall wainscoting of poles and plaster. Why, if that portion of the pit was to be concealed by the earth fill over the framework, should a facing be placed in front of the upper wall. It would seem that such a bit of construction was useless and unnecessary effort. There is at least one practical explanation for the feature. The earth in which the pit portion of this dwelling was dug was much softer than that where the other structures were located. In addition it was rather crumbly and the edges of a hole would not hold as well as though the earth were more compact. For this reason it may have been thought advantageous to construct a more substantial wall. Another suggestion is that due to the nature of the ground it was not possible to make as regular a pit as was desired. In order to secure an outline more compatible with the wishes of the builders the wattlework was constructed. This idea was borne out to some extent by the fact that on the northeastern arc the face of the pit and the pole and plaster wall were some distance apart. The space between was filled with material from a refuse pile.

Perhaps the reasons suggested in the preceding paragraph for the erection of the wainscoting in front of the wall of the pit also applied in the matter of the bench. Because the earth was so soft and crumbly it was necessary to actually build a bench.

The covering up of a carefully constructed wainscoting has been observed in other instances. A good example of the latter is to be found in some of the kivas in the Chaco Canyon in northwestern New Mexico. A number of these circular ceremonial chambers showed distinctly that the wall between the bench and the cribbed roof had been faced with a series of vertical poles.[41] They had no utilitarian value in the kivas because the walls were of stone and they could not have been seen as they were covered with plaster.

As an explanation for the presence of the poles in the Chaco structures it was suggested, in a discussion of the survival of old house features in kivas, that they may have represented the sloping side timbers of the early dwellings.[42] This raises a question in connection with house C. Might it not be possible that the poles in the

[41] Pepper, G. H., 1920, figs. 26, 27; pp. 75–76. Judd, N. M., 1922, p. 108; fig. 113: 1923, p. 137; fig. 130.

[42] Roberts, 1929, p. 89.

Chaco kivas represent a continuance of a feature similar to that in house C rather than the actual sloping superstructure timbers? Many things in the group suggested that house C may well have been the ceremonial chamber for the cluster of domiciles. If such was true, the later kiva wainscoting could be interpreted as being a survival of features from earlier forms of the ceremonial chamber instead of the actual dwellings. The wall facing in the earlier kivas might represent a continuance or they may have originated from actual need as in the Group 2 structure. The latter would seem to be the more logical explanation because it would not be necessary to represent the wall poles in structure where such were actually present. The whole problem is so involved, however, that until further evidence is available conclusions should be held in abeyance.

The fire pit in house C was fairly circular in form, although its outline was flattened by the stone which separated it from the ladder pit. The latter was of the regular type. Both had been enclosed by a plaster rim. The ridge was somewhat broken in places but its former extent could be traced clearly on the floor. There was nothing in the rectangular pit to indicate what kind of ladder had been used in the structure.

The sipapu was present in the customary place at the northeast side of the fire pit. In all of its general characteristics it was similar to those previously described. There was one thing connected with it, however, which was of considerable interest. The hole, as was found to be the case in several other instances, was filled with clean sand. In the center of the sand was a smooth, slim stone cylinder. The upper end of the object had either projected slightly above the sand or else was so close to the top that the heat from the burning superstructure had shattered it. Not all of the fragments were found so it is not possible to determine what the original length of the stone had been.

The Zuñi laborers immediately stopped work when the object was found and gathered around to look it over, a thing which rarely occurred during the progress of the excavations. All insisted that it was a kiva stone. Further information could not be obtained from them and there was nothing to indicate what its function might have been. It may have been some sort of fetish which was kept in the sipapu. Similar examples have not been found elsewhere, however, so it is not likely that it represents a common feature.

There was an oval-shaped storage basin in the floor midway between the two main support posts on the southeast side of the room. This depression in the floor was quite similar to those already described. There was nothing in it to indicate what it may have

contained or what other uses might have been made of it. There were no other storage pits in the house.

The ventilator was similar in constructional features to those in houses A and B of the first group. The forepart of the tunnel had a wooden framework of upright posts supporting small cross poles. This framework was still intact when the passage was cleared of the débris which had accumulated in it. The poles had been covered with plaster before the earth and refuse fill which formed the core of the bench was dumped around it. From the wall of the pit to the bottom of the vertical shaft the passage was tunneled. As in the case of some of the other dwellings, the opening into the room had been reduced in size by a plaster "apron" built in front of and around the mouth of the tunnel. The sill of the aperture was grooved to hold a stone slab.

The shaft at the outer end of the ventilator tunnel was oval in form and comparatively large. It must have been unusually effective because in addition to the door stone to close the inner end of the passage the occupants had provided a large slab to cover the ground level opening. It might have been that such a stone also was intended to protect the opening in times of storm so that rain and snow would not fall into the shaft. This was the only place where indications of such a feature were found. The slab which had been used over the hole was broken, but all of the pieces were in the bottom of the shaft and from them it was possible to determine the size. It had been large enough to completely cover the opening.

House C had a diameter of 14 feet 3 inches (4.343 m.) on the sipapu, fire pit, ventilator line inside the bench. Above the bench it measured 17 feet 7 inches (5.359 m.). At right angles to the above line the diameter inside the bench was 15 feet 4 inches (4.673 m.) and above the bench 19 feet 6 inches (5.943 m.). The depth of the pit was 7 feet 4 inches (2.235 m.) on the side opposite the ventilator and 7 feet (2.133 m.) where the latter opened into the room. At the ventilator side the bench was 4 feet (1.219 m.) above the floor and at the opposite wall 4 feet 1½ inches (1.257 m.). The bench ranged in width from 1 foot 9 inches (54.34 cm.) to 2 feet 4 inches (71.12 cm.). The small vertical poles in the wattlework wainscoting were set at intervals of approximately 6 inches (15.24 cm.). The timbers were quite regular in size and their diameters did not vary far from the 2-inch (5.08 cm.) average.

The fire pit had diameters of 2 feet 1 inch (63.5 cm.) and 1 foot 11 inches (58.42 cm.). Its bottom was 4 inches (10.16 cm.) below the floor line and 8 inches (20.32 cm.) below the top of the plaster ridge. The stone separating the two pits was 1 foot 5 inches (43.18

cm.) long, 1½ inches (3.81 cm.) thick, and rose 3 inches (7.62 cm.) above the top of the ridge in which it was set. The ladder pit measured 1 foot 4 inches (40.64 cm.) by 1 foot 6 inches (45.72 cm.). Its depth below the floor line was 3 inches (7.62 cm.). The inclosing ridge of adobe added another 3 inches (7.62 cm.), making a total depth of 6 inches (15.24 cm.). The plaster ridge bordering the two pits had an average width of 5 inches (12.7 cm.). Around the fire pit it had a height of 4 inches (10.16 cm.) but dropped to 3 inches (7.62 cm.) around the ladder pit.

The sipapu was 1 foot 9 inches (53.34 cm.) from the edge of the rim around the fire pit. The diameter of the hole was 6 inches (15.24 cm.) and its greatest depth was 10 inches (25.4 cm.). The latter was at the very center of the hole. The bottom was not flat but curved upward around the edges to meet the sides of the hole.

The storage basin was 2 feet 4 inches (71.12 cm.) wide and 3 feet (91.44 cm.) long. Its average depth was 4 inches (10.16 cm.). It was 2 feet 10½ inches (87.63 cm.) from the west support post and 1 foot 9 inches (53.34 cm.) from the south. There were 2 feet (60.96 cm.) between its southern end and the wall of the room.

The north support post had a diameter of 6½ inches (16.51 cm.) and stood 2 feet (60.96 cm.) from the wall. The east pole was 8 inches (20.32 cm.) in diameter and was 1 foot 1 inch (33.02 cm.) from the wall. The south pillar also had a diameter of 8 inches (20.32 cm.) and stood 1 foot 4½ inches (41.91 cm.) from the face of the bench. The west pole was the largest. Its diameter was 10½ inches (26.67 cm.) and it had been placed 1 foot 10 inches (55.88 cm.) from the wall. Only the butts of the north and east poles were removed from the holes in which they stood and each was found to have been set at a depth of 30 inches (76.2 cm.).

The plaster "apron" in front of the tunnel of the ventilator projected into the room 6 inches (15.24 cm.). The opening in it was 9 inches (22.86 cm.) wide and 1 foot 1 inch (33.02 cm.) high. The groove in which the cover slab for the opening rested was 3 inches (7.62 cm.) above the floor and had a depth of 1 inch (2.54 cm.). The sill of the aperture was 6 inches (15.24 cm.) above the floor of the room and 1½ inches (3.81 cm.) higher than the bottom of the passage. Back of the opening the tunnel was 1 foot 7 inches (48.26 cm.) high and 1 foot 3 inches (38.1 cm.) wide. Where it opened into the shaft it was 1 foot 7 inches (48.26 cm.) wide and 2 feet (60.96 cm.) high. The tunnel proper was 4 feet (1.219 m.) long. The shaft was 2 feet 11 inches (88.9 cm.) in diameter on the passage line and 3 feet 6 inches (1.066 m.) at right angles to it. The bottom of the shaft was 5 feet 10 inches (1.778 m.) below the ground level.

House D more nearly corresponded to the large structures in its characteristics than did any of the other small dwellings. The pit was roughly oval and rather irregular in outline, due to a concavity near the ventilator. In comparison with house C (fig. 5) the subterranean portion was rather shallow. The bench around the upper edge of the pit was narrow, although sufficiently broad to provide a foundation for the sloping wall poles. The bench, in contrast to that in house C, had been dug into the earth and not built up. In this the method of construction was like that observed in the benches of the dwellings of the first group.

The superstructure had probably been of the customary form. That it had been supported by four upright posts was shown by the holes where they were set in the floor. Bits of decayed wood adhered to the sides of the molds. There were no traces of the side poles but that such were used may be surmised from the fact that provision was made for them in the preparation of the bench.

The fire pit in the center of house D was distinctly oval in outline. The pit was surrounded by a plaster ridge and on the side toward the ventilator opening an upright slab of stone had been embedded in the rim to provide a deflector. There was no definite ladder pit, but in the floor in the position which it would have occupied were two holes. The latter showed where the lower ends of the poles forming the main parts of the device for entering and leaving the structure had been embedded. The decayed butts of the timbers were present and there was sufficient slant to the molds to indicate that the ladder had undoubtedly rested there. This house, as previously mentioned, was one of those giving evidence of the early development of the runged ladder.

There was a circular depression in the floor between the holes where the ladder posts had been set and the ventilator opening. What its purpose may have been could not be determined. Its depth was not great enough to have caused any inconvenience to a person using the ladder. If it had not been so regular in outline it could easily have been explained on the basis of wear due to the turning of the feet by people stepping down from the ladder. As a matter of fact there was a slight depression caused by abrading of the surface of the floor between the ladder holes. Hence the larger circular depression should be attributed to some other factor. A large rounded bottom vessel could have been set in the depression and thus kept in an upright position. The location so close to the ladder would not have been particularly advantageous either from the standpoint of the security of the vessel and its contents or the use of the ladder. Hence it would seem that it must have been intended for some other purpose.

There was a sipapu in the floor in the proper position with respect to the fire pit. It differed from the others in the house group only in the matter of size. The diameter was somewhat smaller and its depth was not as great as some of the other examples. There were no storage holes or recesses in the pit.

The ventilator of house D was quite similar to those in A and B. It was very simple, consisting as it did of a small unplastered shaft and tunnel. There was a marked difference in the feature here, however, in that its opening into the room was at a considerable height above the floor. Only one other structure had an aperture which was at all comparable in this respect. The general tendency was for the opening to be on or, at most, a few inches above the floor level, not well up in the side of the wall as observed in this structure.

House D measured 11 feet (3.352 m.) on the sipapu, fire pit, ventilator line inside the bench. Above the bench it was 13 feet (3.962 m.). Across the other way the inside diameter was 10 feet 3 inches (3.124 m.) and above the bench it was 12 feet 6 inches (3.81 m.). The floor of the pit was 4 feet 6 inches (1.371 m.) below the ground level on the side opposite the ventilator and 3 feet 6 inches (1.066 m.) at the aperture. The difference in this instance was due both to a slight upward slope of the floor and to the fact that the pit was dug into a natural ground slope.

The top of the bench was 2 feet 9 inches (83.82 cm.) above the floor in front of the ventilator. At the opposite side of the chamber it was 3 feet 1 inch (93.98 cm.) high. The bench ranged from 9 inches (22.86 cm.) to 1 foot 3 inches (38.1 cm.) in width. The narrowest part was near the ventilator opening.

The fire pit had a long diameter of 1 foot 6 inches (45.72 cm.) and a short one of 1 foot (30.48 cm.). Its depth was only 1 inch (2.54 cm.) below the floor line, but the added 4 inches (10.16 cm.) of the enclosing rim of plaster made a total of 5 inches (12.7 cm.). The bordering ridge varied between 4 and 5 inches (10.16 and 12.7 cm.) in width. The deflector stone was 1 foot 1 inch (33.02 cm.) wide and 2 inches (5.08 cm.) thick. When the débris was removed from the pit during the investigations it was found that this stone had been broken, but the fragments showed that it had stood 1 foot 2 inches (35.56 cm.) above the floor. The holes for the ladder timbers were 9 inches (22.86 cm.) from the edge of the fire pit rim. They were 9 inches (22.86 cm.) apart and had diameters of 4 and 5 inches (10.16 and 12.7 cm.). The poles had been set into the floor to a depth of only 6 inches (15.24 cm.).

The depression between the ladder post molds and the ventilator was 7 inches (17.78 cm.) from the holes and 2 feet 3 inches (68.58

cm.) from the wall. Its greatest depth was at the center where the bottom was 1 inch (2.54 cm.) below the floor line. The diameter of the depression was 11 inches (27.94 cm.).

The sipapu was exactly 1 foot (30.48 cm.) from the edge of the fire pit rim. The diameter of the hole was 3 inches (7.62 cm.) and its depth was 5 inches (12.7 cm.). The holes for the main support posts ranged from 4 to 8 inches (10.16 to 20.32 cm.) in diameter. All had been placed rather close to the wall. Two of them, the east and west, were 3 inches (7.62 cm.) from the face of the bench. The south one was 4 inches (10.16 cm.) and the north 6 inches (15.24 cm.) from the wall. The posts had not been set as deeply as some of those in the larger structures. The average, from which there was but slight variation, was 1 foot 10 inches (55.88 cm.).

The ventilator opening was 7½ inches (19.05 cm.) wide and 1 foot 2 inches (35.56 cm.) high. The sill was 11 inches (27.94 cm.) above the floor. The tunnel was 1 foot 2 inches (35.56 cm.) long. The shaft at the outer end had a diameter of 1 foot 1 inch (33.02 cm.). The bottom of the shaft was 1 foot 9½ inches (54.61 cm.) below the surface of the ground.

The pit which has been lettered house E on the plan (fig. 5) may or may not have been intended as the subterranean portion of a dwelling. As previously mentioned, work on this particular structure was possibly never carried to completion. There were no traces of plaster on the wall, no signs of holes for support posts, and nothing to indicate that it had had a fire pit was observed. It is, of course, possible that it may have been a large storage structure with a conical covering of the type already described. The pit was rather large, however, to have been roofed in such a fashion. This, together with the lack of plaster and other features, would tend to support the belief that the structure had never been finished.

The pit had diameters of 10 feet (3.048 m.) and 9 feet 6 inches (2.895 m.). The depth varied somewhat from side to side but closely approximated the average of 2 feet 9 inches (83.82 cm.).

Two exterior fire pits and one definite storage place were associated with this house group. The location of all three is sufficiently shown by the plan of the group (fig. 5) to warrant the omission of a detailed description of their relationship to the other structures. The fire pits were of the simple circular form which was dug into the earth. Their sides were covered with plaster but no stones had been used in the lining. One had a diameter of 2 feet (60.96 cm.) and the other measured 1 foot 10 inches (55.88 cm.) across. Both had a depth of 1 foot (30.48 cm.).

The storage pit had curved walls but definite corners. The structure had been destroyed by fire. The upper part of the débris which filled the pit consisted of charred poles and brush and burned blocks of plaster. The lower half was largely composed of burned corn. The maize had been placed in the granary on the cob. There were no indications of interior supports for the upper part of the bin, so that the superstructure must have been of the conical type. The pit measured 4 feet 4 inches (1.32 m.) by 4 feet 9 inches (1.447 m.). Its depth was 2 feet (60.96 cm.).

The refuse mound for the house group was located east of dwelling C and south of house B. It was not very extensive, as its total length was only 30 feet (9.144 m.) and its breadth 17 feet (5.181 m.). The depth was not marked, 2 feet 6 inches (76.2 cm.) being the maximum. The mound had contained burials at one time, but it had been dug into by previous visitors to the site and most of the material removed from it. Scattered fragments of human bones and large pieces from pottery vessels which had been used as mortuary offerings clearly indicated that the mound had been the cemetery as well as the place for the deposition of waste matter from the houses.

Not all of the interments had been made in the refuse mound. Several bodies had been placed in shallow, irregular-shaped graves between the northwest side of house C and the storage pit. One, that of a child, was very close to the fire pit. The burial of children near the hearth was not uncommon in the Southwest, judging from the frequency of such finds. The reasons for such a practice can not be known, but it would seem that there must have been some significance in the custom. The mother may have wanted the remains kept as near to her as possible in order that some maternal longing might be satisfied. Again she may have felt that under such circumstances the little one would be less lonesome. Another explanation which could be offered is that the feature might be considered as an indication of a desire to keep the family circle from being broken. The latter custom has been world-wide in its distribution among peoples of lower cultures and may well have been present in the Southwest in the early Pueblo horizon. Certain phases of the belief have been observed in recent times among some of the modern Pueblos, especially in the burial of the dead beneath the floors of houses. A similar practice was prevalent in the late prehistoric period and it is quite possible that the customs and beliefs survived from the early days of the culture.

GROUP NO. 3

House Group No. 3 was located 260 feet (79.248 m.) a little south of east from Group No. 1. It consisted of the remains of 5 dwellings of the pit type, 3 storage pits, and 2 exterior fire pits. In addition there were the ruins of two rectangular structures which had been erected on the ground level. One of these had been of jacal construction and the other apparently had had walls of puddled adobe. The pit houses were all of the comparatively simple form without encircling bench. The ventilators were of the general type noted in previous pages, although they had slightly different characteristics, as will become apparent in the discussion of each structure.

The pit for house A was somewhat irregular in outline, as will be observed from the plan of the group. (Fig. 7.) The walls were sufficiently curved to give the general impression of a roughly oval-shaped excavation. However, they met at three points in such a way that noticeable, although not sharp, corners were formed. The subterranean portion of the dwelling had been roofed over with a pole, brush, and plaster superstructure supported on four posts. It is probable that this covering was similar to those postulated for houses A and B in the second group. The slanting side poles had extended from the ground level around the edges of the pit. There was no evidence that their lower ends had been embedded in the earth around the periphery. The support posts were set so close to the walls that on three sides quite short timbers could have been employed in the sloping walls. On the fourth, that opposite the ventilator, longer ones would have been needed. Even so, the side walls were probably not heavy enough to require any special provision for holding the timbers in place. The natural tendency for the end of a slanting stick to adhere to the surface of the ground would have sufficed to hold them in the proper position.

The interior was comparatively simple. The fire pit was of the saucer-shaped, plaster basin variety without an enclosing ridge of adobe. It was fairly large and oval in contour. The ladder pit was of the same rudimentary form. It consisted of a roughly circular depression in the floor between the fire pit and the ventilator opening. It had no plaster rim around it and there was no stone separating it from the fire pit. There were no indications that a deflector had been placed in front of the aperture to the ventilator. The only other hole in the floor, excepting those where the posts for the superstructure had stood, was the sipapu. It was of the same general character as those described in previous pages.

The ventilator consisted of a simple tunnel and shaft. The opening into the room had not been augmented in any way. It was

merely the mouth of the horizontal passage. The floor of the latter sloped upward to the shaft at the outer end. The shaft was roughly circular in form. The walls of both the tunnel and shaft had been

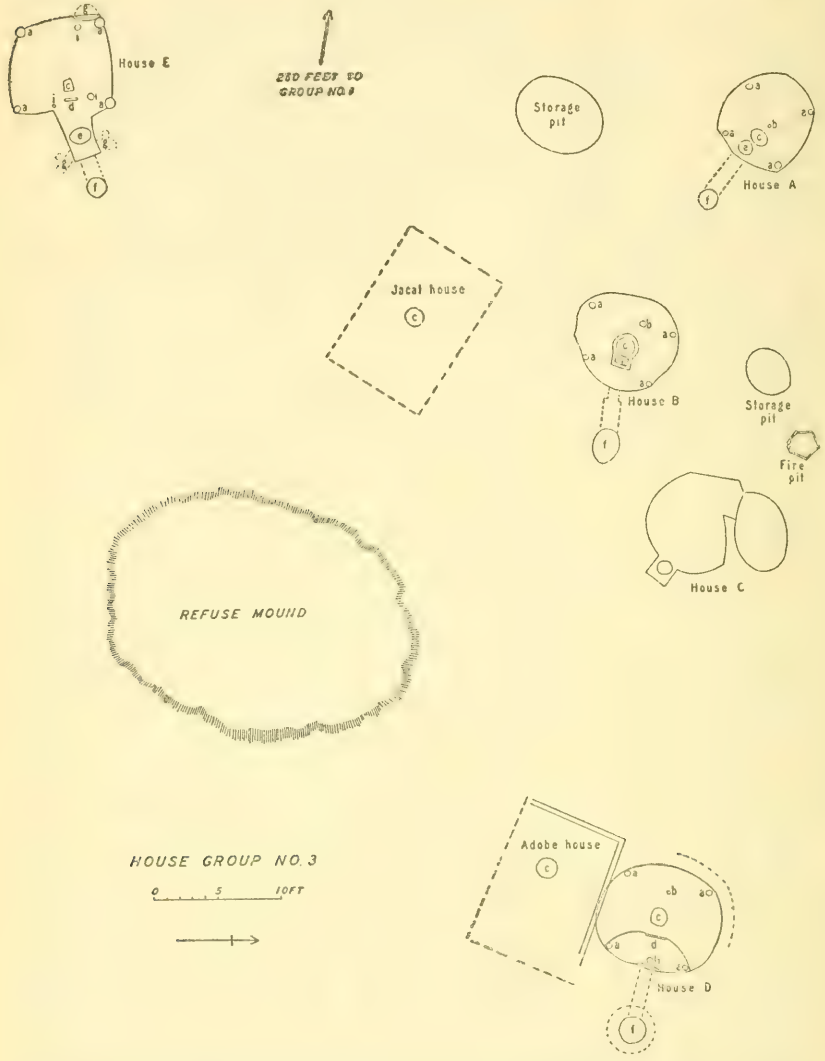


FIGURE 7.—Plan of House Group No. 3; *a*, Holes for main support posts; *b*, sipapus; *c*, fire pits; *d*, deflectors; *e*, ladder rests; *f*, ventilator shafts; *g*, wall recesses; *h*, hole in floor in front of ventilator opening, storage holes in floor

plastered with mud. In proportion to the size of the house the horizontal passage was slightly longer than those in the larger structures. Furthermore, it had been constructed entirely by the tunneling method. There had been no trench in the side of the

room and no building up of the forepart with timbers in the manner described for some of the first group houses. The task of digging the passage and plastering the walls, floor, and ceiling must not have been particularly easy, since the width and height were only sufficient to permit a rather small person to enter it. Similar difficulties must have been encountered in the shaft, as it did not have a very large diameter. The work of removing the accumulated débris from the ventilator was tedious and there can be no question but what the tunneling of the native earth was even more laborious. This would be true especially when the only implements available for such work were those fashioned from wood and stone.

House A measured 7 feet 6 inches (2.286 m.) on the diameter from the ventilator opening to the opposite side of the room. On a line at right angles to the preceding diameter it was 7 feet (2.133 m.) from wall to wall. The pit had a depth of 4 feet 6 inches (1.371 m.).

The fire pit had a diameter of 1 foot (30.48 cm.) on the ventilator line and 1 foot 6 inches (45.72 cm.) at right angles to it. The pit was rather shallow. Its bottom was just 5 inches (12.7 cm.) below the floor line. The absence of an encircling rim made the lack of depth more apparent. The depression for the base end of the ladder was 3 inches (7.62 cm.) from the fire pit. It had a diameter of 1 foot 1 inch (33.02 cm.) and 1 foot 3 inches (38.1 cm.). The depth was 3 inches (7.62 cm.).

The sipapu was just 7 inches (17.78 cm.) from the edge of the fire pit. The hole was 3 inches (7.62 cm.) in diameter and had a depth of 6 inches (15.24 cm.). The holes for the support posts ranged from 5 to 7 inches (12.7 to 17.78 cm.) in diameter. Three of them were 2 inches (5.08 cm.) from the wall, while the fourth was 3 inches (7.62 cm.) away. They approximated closely the average depth of 2 feet (60.96 cm.).

The opening into the ventilator tunnel was 1 foot 3 inches (38.1 cm.) wide and 1 foot 6 inches (45.72 cm.) high. The tunnel had a length of 3 feet 3 inches (99.06 cm.). The shaft was 1 foot 6 inches (45.72 cm.) in diameter and 3 feet (91.44 cm.) deep.

House B of Group 3 was very irregular in its outline. (Fig. 7.) The general characteristics of the structure were in keeping with the customary features found in the small dwellings throughout the various groups. The pit, however, could not be called circular or oval, even though its walls were curvilinear. As in the case of most of the small remains, there was no bench encircling the upper edges of the pit.

There were four holes in the floor in the proper positions for the main support posts. The remainder of the superstructure no doubt

followed the form already postulated. The upper portion of the dwelling was probably elevated above the ground level to a greater extent in this house than it was in the A structure. The reason for this supposition is to be found in the depth of the pits. House B was somewhat shallower than A and in order that the occupants might have sufficient head clearance it would have been necessary for the framework to rise higher above the surface.

The interior furnishings were comparatively simple, although house B had more elaborate fire and ladder pits than A. Here, as in some of the larger structures, the two were joined and inclosed by a bordering rim of plaster. The fire pit was of the roughly circular form and the ladder rest was rectangular. It was so narrow in proportion to its length that it would suggest the use of a runged ladder rather than one of the notched pole variety. There was nothing in the pit itself to indicate that either had been used, but from the fact that there was such a depression and from its form it is reasonably safe to assume the presence of a double-poled ladder. The ridge of plaster which separated the two pits did not have a reinforcing slab of stone.

The only other feature in the room was the sipapu, which was located midway between the fire pit and the west wall. There were no storage holes or subwall recesses. There was nothing to indicate that a deflector had been erected between the fire pit and the ventilator opening.

The ventilator was of the tunneled variety. The opening into the room had been covered with plaster but in no way reduced in size (pl. 5, *c*) in the manner in which some of those in the larger structures had been. The mouth of the passage was not as large as the main body of the tunnel, as may be observed from the plan of the group. (Fig. 7.) This was the direct result of tunneling operations, however, and not due to an application of a mud frame around the aperture. A short distance from the opening the tunnel was considerably narrowed and there were definite corners in the walls. This feature may be explained on the basis of need for room in which to work during the construction of the tunnel. Proceeding from the shaft end, the diggers made a passage wide enough to permit the removal of earth without too great effort. Even so, it must not have been easy to work out this passage. When the tunnel had penetrated to within a short distance of the wall of the room it was possible to complete the work on a smaller scale. It is possible that the smaller section was started from the room on the basis of the size requirements of the structure, meeting the larger where it ended. The actual process may have been just the reverse but the principle involved would remain the same.

The tunnel in this structure was somewhat unusual in the distinct step at the shaft end. In most cases the floor of the passage sloped upward to meet the bottom of the shaft, but here an actual step was made. There did not seem to be any good reason why such should have been done. Perhaps it was purely an expression of individual fancy on the part of the builders. The walls, floor, and ceiling of the tunnel and the walls and bottom of the shaft had been covered with a coating of adobe plaster.

House B measured 7 feet 6 inches (2.286 m.) on the ventilator, fire pit line. Across the other direction it was 8 feet 1 inch (2.463 m.) from wall to wall. The pit had a depth of 3 feet 6 inches (1.066 m.) at the ventilator side and 4 feet (1.219 m.) at the opposite wall. This was due to two factors, a slope in the surface of the ground and in the floor itself. The latter was somewhat higher near the ventilator opening. This difference in floor level was not pronounced enough, however, to be considered a sort of platform such as that in house C of this same group. This feature was discussed in connection with the plaster ridge connecting the two main support posts on the ventilator side of house B, Group 1.

The fire pit had a diameter of 1 foot 5 inches (43.18 cm.). The bottom of the basin was 3 inches (7.62 cm.) below the line of the floor and 5½ inches (13.97 cm.) below the top of the inclosing rim. The ladder pit was 1 foot (30.48 cm.) long and 6 inches (15.24 cm.) wide. The difference in the floor level gave the pit a depth of 6 inches (15.24 cm.), including the plaster ridge, on the ventilator side. Next to the fire pit the depth was only 4 inches (10.16 cm.). This was due to the fact that the ridge separating the two pits was not as high as the bordering rim. The rim had an average width of 5 inches (12.7 cm.) and a height of 2½ inches (6.35 cm.).

The sipapu was 1 foot (30.48 cm.) from the edge of the fire pit rim. It was not as circular in outline as some. Two diameters at right angles measured 5 and 6 inches (12.7 and 15.24 cm.). The hole had a depth of 8 inches (20.32 cm.). The molds left by the main support posts were from 5 to 6 inches (12.7 to 15.24 cm.) in diameter. The two at the ventilator side of the structure were against the wall. Of the other two, the north post was 2 inches (5.08 cm.) and the south 4 inches (10.16 cm.) from the wall. Their depths averaged 2 feet (60.96 cm.).

The ventilator opening was 10 inches (25.4 cm.) wide and 1 foot 3½ inches (39.37 cm.) high. The bottom of the opening, which was also the floor of the tunnel, was 5 inches (12.7 cm.) above the floor of the room. The tunnel widened to 1 foot 6 inches (45.72 cm.) at a distance of 9 inches (22.86 cm.) back from the aperture. From the mouth of the tunnel to the bottom of the shaft the passage was

3 feet 2 inches (96.52 cm.) long. At the outer end the tunnel was 1 foot 6 inches (45.72 cm.) wide and 1 foot 10 inches (55.88 cm.) high. The step from the tunnel to the floor of the shaft was 5 inches (12.7 cm.) high. The shaft had a diameter of 2 feet 8 inches (81.28 cm.) on the passage line and 2 feet (60.96 cm.) at right angles to it. The shaft had a depth of 2 feet 11 inches (88.9 cm.).

House C was very curious in form; in fact it was unique. (Fig. 7.) The structure seemed to have consisted of two rooms connected by a narrow opening. The smaller of the chambers was fairly oval in outline, while the larger was decidedly irregular in form. The impression gained from a careful study of all the features associated with the pits was that they originally had been distinct and later were joined together by the digging of a connecting trench. Such a view makes the question of the superstructure a bit hard to explain, as will be noted in the following paragraph. The oval pit may have been the subterranean portion of a storage bin which had been built quite close to a small house. Later, for some reason or other, it was decided to join the two, with the results shown in the plan. Both pits were quite shallow in comparison with those of the other structures. The oval chamber was deeper than the larger one. At the opening between the two there was a decided step.

There was nothing whatever to indicate what kind of superstructure had been placed over the pits. There had been no interior support posts. Consequently it may be suggested that the covering was of the conical type previously described for the storage pits. With a tripod of heavier poles erected over each pit it would be possible to build a framework of leaning poles which would support a reed, brush, and plaster covering. The straight side, along the trench connecting the two pits, could easily have been roofed over with poles slanting to each tripod. It would have been much simpler to erect such a framework in the beginning than to make the necessary alterations to two superstructures in order that they might be combined into one. For that reason it may be that upper portions of the two chambers were erected as a unit and did not result from the joining of two separate structures. The evidence in the remains of these pits was so meager, however, that it is not possible to draw conclusions one way or the other.

The only interior feature was a small circular depression in the floor of the niche at the southeast side of the larger chamber. What it may have been intended for was not determined. That it was not a fire pit was certain because there were no signs of fire around it. The niche itself was a puzzle. Whether it was the lower part of an entrance or a storage recess could not be ascertained. One suggestion is that it may have been a recess for the storage of

objects and that the depression was the rest for a large jar or basket. The latter seems more plausible than to suppose that the recess was the lower part of a doorway. The depression in the floor would have been decidedly annoying to anyone stepping down into the niche.

There were no traces of a ladder or sipapu. The customary fire pit also was lacking, although a burned spot on the floor near the center of the large chamber showed that fires had been built inside the structure. The absence of a definite pit had not prevented the occupants from having a small blaze when the need arose. There were no indications of a ventilator, unless the niche at the southeast side had served in that capacity. As a matter of fact in some respects it seems doubtful that C actually was a house. It may have been a large granary which, due to press of circumstances, was temporarily employed as a dwelling. If it really was a house, the major part of the "home life" must have taken place around the exterior fire pit just west of the oval chamber. Under such conditions the structure probably was just a place in which to sleep or to obtain shelter in time of storm, this feature being more marked for house C than the other dwellings. In any case the evidence was so unsatisfactory that all explanations must be considered solely as postulations.

There was nothing in the oval pit to suggest its use. The ultimate end to which it was put was that of a burial place. When the débris was removed from the structure a skeleton was found lying on the floor close to the wall which separated the two chambers. All indications were that it was an actual interment and not the remains of a disaster. The burial may have taken place after the structure had been vacated or it may have been the cause of the abandonment of the house.

The large pit measured 6 feet (1.828 m.) on a north-south diameter and 8 feet (2.438 m.) on the east-west. The average depth of the pit was 2 feet 6 inches (76.2 cm.). The niche at the southeast side of the large chamber was 1 foot 8 inches (50.8 cm.) deep and 1 foot 10 inches (55.88 cm.) across the opening. The pit or depression in the niche was 1 foot 2 inches (35.56 cm.) in diameter and 3 inches (7.62 cm.) deep. The opening between the two rooms was 2 feet (60.96 cm.) wide. The oval chamber measured 6 feet 2 inches (1.879 m.) by 4 feet (1.219 m.). The pit had an average depth of 3 feet 6 inches (1.066 m.). The step at the doorway was 11 inches (27.94 cm.) high.

House D was one of the best preserved and most interesting of the small dwellings. (Pl. 6, *a*.) There were a number of instructive things connected with it in addition to the actual house features.

One of these was the slight superposition of a portion of the wall of an adobe structure. (Fig. 7.) The latter had just passed over the fill at one side of the pit. It was not a pronounced example of stratigraphy, but it was sufficient to show that the rectangular room on the surface was a subsequent building. That such had been the case, however, was definitely shown by another phenomenon. Overlying the débris-filled pit and extending for some distance in all directions was a layer of caliche, a compact residual deposit cemented by an infiltration of calcareous material.

The stratum of caliche was indisputably of later date than the house. The foundations of the adobe structure rested upon the deposit. Thus there was additional evidence, of a decidedly conclusive nature, showing the later construction of the above-ground house. The pit dwelling had been vacated, fallen into ruin, and its subterranean portion completely filled with accumulated débris before the caliche was formed. After the latter had developed and become a hard, compact surface the rectangular structure was erected. Such a combination of factors shows a lapse of a certain amount of time between the periods of occupation of the two structures.

No great degree of emphasis should be placed on the length of time indicated by layers of caliche. Occasionally a considerable period may be represented by such formations and again they may develop very quickly. An example of the rapidity with which such deposits form under proper conditions was found in a refuse mound not far from the third group of houses. When the mound was being trenched one of the workmen cut through what appeared to be a section of a tunnel. On the supposition that a ventilator passage had been revealed, the man was directed to follow the tunnel in an effort to locate the house.

The passage was filled with sand, ashes, and other débris. Across the top was an unbroken stratum of caliche several inches thick. The removal of the accumulated material proved an easy task. The work had not progressed very far until curious markings began to appear along the walls of the passage. Careful inspection showed that they had been made by an implement suspiciously suggestive of a modern pick or shovel. This was rather puzzling because the workman removing the fill was not using such a tool. He was digging only with a small hand trowel. To further complicate matters it was observed that there were no marks of any kind on the ceiling of the tunnel. This was indeed a curious state of affairs. Why a passage dug into the earth would show the marks of excavation on its walls but not the ceiling was a little confusing. The fact that the wall marks in some instances seemed to have started above the

top of the passage made it even more perplexing. While endeavoring to arrive at some solution for the problem, the end of the tunnel was reached and a totally unexpected object found. Lying on the floor against the end wall was an ordinary whisk broom. While the marks on the wall had intimated a modern origin for the tunnel the whisk broom assured it.

The problem of the lack of excavation indications on the ceiling of the tunnel was still unsolved. Likewise it seemed strange that any modern investigators should have gone to the trouble of tunneling through rather hard ground. To the end of securing additional data, work was started at the opposite side of the intersecting trench and the fill removed from the other end of the tunnel. The latter did not extend as far as the first section. The floor turned quite sharply upward and not far from the side of the intersecting trench ended abruptly against the ceiling. This showed clearly that before the exploratory trench had been driven through it the tunnel was completely closed, a rather curious phenomenon, to say the least. Further investigations showed that it had never been a tunnel but a trench.

The trench was one which had been dug by Doctor Kidder's party in 1923, it was learned subsequently. After the group left the site the exploratory ditch which had been dug gradually filled with windblown material. Then, due to the existence of a proper set of conditions, the layer of caliche had formed over it. The time element involved was extremely short, six years at most, and emphasizes clearly the point previously made, that no great reliance concerning the antiquity of any objects can be placed on the fact that they are found beneath an undisturbed stratum of caliche. Several archeologists in recent years have gone sadly astray in their deductions because of just such a combination of factors. A stratum of caliche over a pit shows that it was subsequent to the excavation. Anything found on top of the layer is unquestionably later still, but the length of time involved may be very short.

The pit of house D was fairly oval in form. It had a slight break in the curve of the wall near the ventilator (fig. 8), but otherwise was more regular than most of the structures. There was no encircling bench around the top of the excavation comparable to that feature in the larger houses. There was a slight suggestion of one around the western and northern arcs of the periphery but not a true bench. One foot (30.48 cm.) back from the edge of the pit was a slight ridge against which the butts of the slanting superstructure poles had rested. There was not a sharp angle, but the change in ground level was sufficient to brace the poles.

The superstructure had been supported by four posts set in the floor near the walls of the pit. The decayed ends of these uprights were still in position when the room was cleaned out. As suggested in the preceding paragraph, there were indications on two sides of the pit that slanting wall poles had been braced against a hump in the surface of the ground. The framework over the excavation

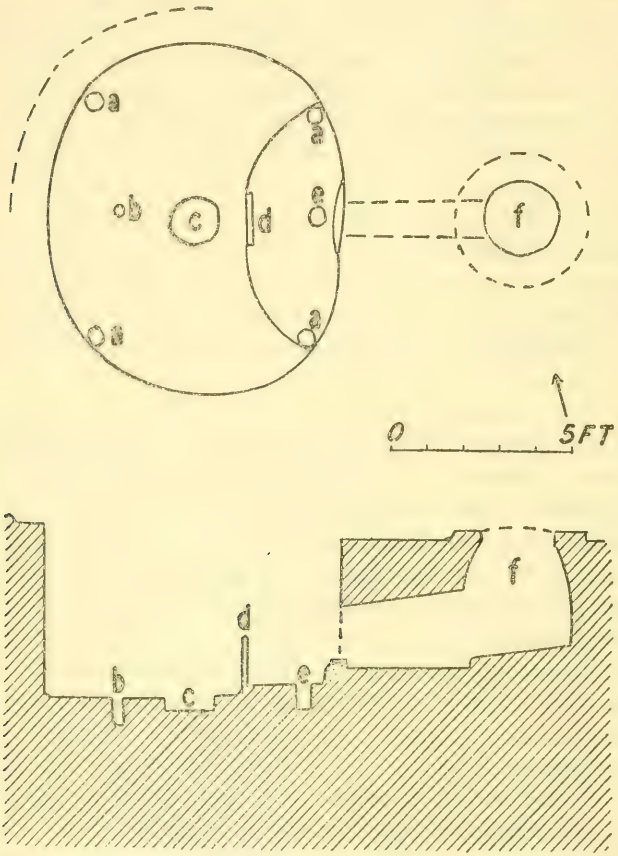


FIGURE 8.—House D, Group No. 3: *a*, Holes for main superstructure posts; *b*, sipapu; *c*, fire pit; *d*, deflector; *e*, hole in floor; *f*, ventilator

probably did not rise very high above the surface because the pit was deep enough so that would not have been necessary.

The fire pit was located in almost the center of the room. The pit was circular in contour and in contrast to many of those already described had vertical instead of sloping sides. This feature is not well illustrated in the photograph (pl. 6, *a*), because a heavy rain fell after the débris had all been removed from the lower portion of the house and before the picture was taken. The water which

collected and stood in the house pit damaged the edges of the fire basin and filled it with sediment. There was no ladder pit. The only indications which could be interpreted as suggesting that such a device had been used were in the abraded surface of the floor between the deflector and the ventilator opening. Even these were not clear enough to be convincing. It is possible that no ladder was employed, unless on special occasions, and that the ventilator was used as an entrance. This was the only structure suggesting such a rôle for that particular house element.

Approximately midway between the fire pit and the west wall of the room was the small hole which has been likened to the sipapu. There was only one other hole in the floor, excepting of course those where the main supports were set. It had a rather large diameter and was located directly in front of the ventilator opening. At first it was thought that the lower end of a notched log ladder had been embedded there, but there was no slant to the hole. Then the possibility that it might have been for a post to hold a door slab in position in front of the aperture was considered. There were no timber imprints on the plastered walls of the hole, however, and that explanation was eliminated. The only remaining suggestion is that it may have been for the storing of small objects. Its location was not particularly favorable for such use, although that consideration may not have had much weight with the occupants of the house. There may be some significance beyond that of purely utilitarian function in the presence of such a hole in the floor. The feature is not uncommon in houses of this type. In both Basket Maker III and Pueblo I structures it occurs with a certain degree of regularity. An explanation for the phenomenon is still to be found, however.

The deflector was a thin slab of stone set in an upright position between the fire pit and the ventilator opening. The lower end of the slab was embedded in the floor at the edge of the raised section or low platform located at that side of the room. As previously mentioned, when the feature was discussed in connection with house B of Group 1, the raised area of the floor was very suggestive of similar occurrences in some of the Late Basket Maker dwellings in the Chaco Canyon. What the significance may have been is conjectural. When the Chaco Canyon houses were described and discussed it was suggested that it was a survival in considerably modified form of the bin-like compartments generally found at that side of the chamber in the Basket Maker III houses.[43] The presence of the feature in house D of this group may be another example of the continuance of an older house element. There were many things about

[43] Roberts, 1929, pp. 51–52.

the general characteristics of the small structures which were reminiscent of the dwelling remains in the Basket Maker III village in the Chaco Canyon. They bore a greater resemblance to the older form than did the more elaborate dwellings of the first group and may well have bridged the gap between the two.

The ventilator of house D was interesting. As suggested in a foregoing paragraph, it may have served as an entrance as well as a means for bringing fresh air into the chamber. That it could have functioned in such a capacity was shown by the fact that the Indians went in and out through the opening after work in the room had reached a stage where it was possible for them to do so. The ventilator in later houses and the circular ceremonial chambers was unquestionably a definite survival of the original form of entrance as found in the dwellings of earlier horizons. Here in house D was an example which might be considered as the step between the two forms, an illustration of the transition from one to the other. That the passage had been intended for something more than a mere vent for air was indicated by the stone sill in the opening into the room. This was the only instance where the surface had been reinforced and suggests that there was provision against wear which was not necessary in the other dwellings. The sill portion of the opening was augmented and built up by the use of adobe rising from the floor to the sill. There was no upper frame or "apron" around the aperture and the end of the tunnel, however.

The entire passage and shaft had been tunneled out of the earth. The passage floor had an almost imperceptible upward slant and there was a low step where it joined the shaft. (Fig. 8.) This feature was similar to the one in house B, although not so pronounced. The tunnel opening was larger at this end.

The shaft was not like those in the other structures in that the sides were not vertical. A short distance below the ground level they curved out and down in such a way that they formed a small bell-shaped chamber. The latter added to the impression that the ventilator may have been an actual entrance. A person stepping down into the small chamber would have had sufficient room to crouch and then crawl into the passage. This provided a place very reminiscent of the antechambers of the Basket Maker III dwellings. The upper end of the shaft had a low rim around the opening, another way in which it differed from the usual form of ventilator.

At the time when the ventilator shaft was cleared out a skeleton was found in the bell-shaped chamber. The body had been in a rather peculiar position, partially leaning against the back wall of the shaft and partially lying on the floor. The lower portion of the body and the legs had extended into the passage. No mortuary

offerings accompanied the remains. They were not in the customary position for a burial. It is quite possible that the person may have died in the antechamber or that the body had been placed there with little ceremony or attention to mortuary practices. It dated from the period preceding the formation of the caliche layer and could not be attributed to the near-by surface house. Because of the porous sand and ashes which had covered the body and due to the fact that the tunnel provided good drainage for intrusive ground water, the bones were in a good state of preservation. As a matter of fact they were in much better condition than the majority of those found.

House D measured 8 feet 3 inches (2.514 m.) on the line of the ventilator, fire pit, and sipapu. The long axis was at right angles to this diameter and the distance from wall to wall was 9 feet 9 inches (2.971 m.). The pit had a depth of 4 feet (1.219 m.) at the ventilator side and 4 feet 9½ inches (1.46 m.) at the opposite wall. This difference was due to a number of things. One was the low platform at the ventilator side of the room, another was the curve in the floor, while the slope in the surface of the ground contributed its share to the discrepancy.

The fire pit had a diameter of 1 foot 4 inches (40.64 cm.) and a depth of 5 inches (12.7 cm.). The sipapu was 1 foot 3 inches (38.1 cm.) from the fire pit. Its diameter was 3 inches (7.62 cm.) and its depth 8 inches (20.32 cm.). The hole in front of the opening into the ventilator had a diameter of 5 inches (12.7 cm.) and a depth of 6 inches (15.24 cm.). Three of the holes for the main support posts had diameters of 5 inches (12.7 cm.) and the fourth measured 6 inches (15.24 cm.) across. They averaged 2 feet 6 inches (76.2 cm.) in depth. One of them touched the wall, one was 1 inch (2.54 cm.) from it, and the other two were 2 inches (5.08 cm.) away.

The deflector slab was 9 inches (22.86 cm.) from the fire pit and 2 feet 2 inches (66.04 cm.) from the plaster bulge in front of the ventilator opening. The stone was 1 foot 7 inches (48.26 cm.) wide. Its top was 1 foot 5 inches (43.18 cm.) above the floor. The slab had an average thickness of 1 inch (2.54 cm.). The raised portion of the floor bounded by the deflector and the two holes for the support posts was 2 inches (5.08 cm.) higher than that in the portion of the room immediately adjacent to it.

The ventilator or passage opening was 1 foot (30.48 cm.) wide and 1 foot 6 inches (45.72 cm.) high. The plaster foundation for the sill projected into the room 4 inches (10.16 cm.). The top of the stone tread was 9 inches (22.86 cm.) above the floor. The tunnel had a length of 4 feet (1.219 m.) from the aperture to the shaft. At the latter end the passage was 2 feet (60.96 cm.) high and 1 foot 2 inches

(35.56 cm.) wide. The step to the bottom of the shaft was 4 inches (10.16 cm.) high. The floor of the shaft was 2 feet 6 inches (76.2 cm.) in diameter on the tunnel line. At the ground level it was 2 feet (60.96 cm.). The diameter at right angles to the above was 2 feet 8 inches (81.28 cm.) on the floor and 2 feet 1 inch (63.5 cm.) on the surface. At the tunnel side of the shaft or antechamber the floor was 3 feet 6 inches (1.066 m.) below the surface of the ground. At the opposite side it was only 3 feet 2 inches (96.52 cm.).

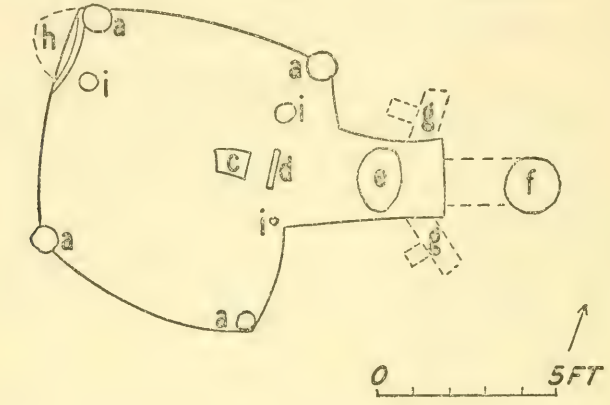


FIGURE 9.—House E, Group No. 3: *a*, Holes for main support posts; *c*, fire pit; *d*, deflector; *e*, probable ladder rest; *f*, ventilator; *g*, wall pockets opening off of alcove; *h*, subwall storage recess; *i*, storage holes in floor

The rim around the opening into the antechamber was not one which had been built up by the use of plaster but one worked out from the ground itself. It had an average width of 10 inches (25.4 cm.) and a height of 3 inches (7.62 cm.).

House E of Group 3 had an irregular and curiously shaped pit. The main part of the subterranean chamber was fairly rectangular in outline but the deep niche at the ventilator side of the room gave it a form which was unique. (Fig. 9.) The recess leading to the

ventilator was totally different from anything observed in the other structures. At first it was thought to be the remains of the ventilator, but when the trench had been completely cleaned of accumulated débris the mouth of the tunnel belonging to that feature was found opening into the recess. Why the builders should have chosen to make this small addition to the main chamber was not apparent. It would have had its advantages, however. (Pl. 6, *b*.)

The superstructure, in accordance with the prevailing custom, had four main support posts. Two of these had been set into their respective corners to such a degree that they were embedded in the walls up to approximately half of their diameters. One post extended into the wall but slightly, and the fourth merely touched the sides of its corner. The sloping poles for three of the walls, the north, south, and west, had probably been placed in nearly vertical positions. Their lower ends may have been set far enough back from the edges of the pit to produce the slant necessary to hold them in position against the upper framework. This would also have formed a narrow ledge, or pseudobench, around the upper part of the pit.

The problem of what kind of a wall was erected on the fourth side, the east, is involved because the question of the recess or alcove covering must be considered in conjunction with it. There are several ways in which the east wall and recess roof might have been constructed. Two especially seem quite plausible. One method would have been to cover the trench with a flat roof, the ends of the component timbers resting on the ground at each side. The main side wall of the dwelling superstructure would then have been erected in the usual manner. The sloping wall poles along the section where the recess opened into the chamber could easily have rested on the roof timbers of the alcove. The result would have been a prolongation of the ventilator tunnel, yet in effect making a small, low-ceilinged chamber. The usefulness of such a house feature is readily apparent. The other method, suggested by a careful study of the conditions involved, would have entailed a somewhat more elaborate planning, although it would not, by any means, have been beyond the capabilities of the people. The alcove may have been roofed over by extending two long timbers, placed about as far apart as the sides of the recess, from the stringer of the main framework to the ground at the end of the niche. These heavy slanting poles would have furnished the support for a lighter series of sticks. Across the top poles and brush would have formed the roof and small timbers extending from the ground to the main pieces would have provided the walls for the small penthouse thus

erected. The wall portions of the main chamber, from the upright posts to the edges of the recess, probably were of the usual form, even under the conditions prevailing with such a construction. Involved as this second form may seem, several factors indicate that it was the type best fitted to the combination of circumstances with which the builders had to cope. One reason for this belief will be considered in connection with the consideration of the placing of the ladder. The exterior appearance of the structure, after it had been covered with brush and earth, would have been that of a truncated pyramid with a small, sloping topped projection at one side.

The fire pit was of the rectangular form, although some of the sides were slightly curved. There was no ladder pit directly adjacent to it. A deflector stone had been set in the floor between the basin and the opening into the alcove. Only the lower part of the stone was in position when the remains were excavated. The fragments which had been broken from it were found in the débris, however, and its size could be determined.

The ladder pit, if such it really was, had been placed in the alcove. (Fig. 9, *e*.) There was some doubt whether or not this depression had really been intended for such a purpose. Since no more satisfactory explanation for it was forthcoming it was assumed to have functioned in that capacity. The abraded surfaces of the bottom and wall at the ventilator side indicated that a post had rested there. Such a timber may well have been a ladder of the notched-log variety. Granting that such had been the case, there was little likelihood that a flat covering had extended across the top of the alcove, unless the opening into the structure had been in this ground-level roof. On the other hand, it would have been possible for a ladder to have sloped from the depression to a hole in the roof of the main superstructure above the fire pit. This would have necessitated an alcove covering of the penthouse form. Such a construction would have been decidedly unique but not at all improbable. The ladder would have been crowded by the walls of the alcove but usable, nevertheless. It must be borne in mind, however, that there was nothing to show definitely that the structure was as described. The foregoing is purely a speculative effort to explain how the builders may have solved this particular problem.

There was no sipapu in house E, although there were a number of holes in the floor at other parts of the room. Two of the latter were comparatively shallow and were partially filled with sand. They were undoubtedly pot rests. One, that located near the northwest support post, had the fragments of a broken culinary vessel in it. The other hole was for the storage of small objects. Two awls and a stone pipe were found in it when the room was excavated.

There were three distinct storage recesses in house E. Two of them (fig. 9, *g*) were very unusual in form. They were located at the end of the alcove near the ventilator opening. They were dug into the earth and were large enough to hold small articles efficiently. The curious feature about them was that in the side of each was a smaller pocket dug at right angles to the main ones. It must have been rather difficult to work them out, but in them the occupants of the house certainly had serviceable hiding places for whatever of value they may have wished to conceal. One of them contained a small stone bowl and the other a stone pipe. The third recess was at the opposite side of the room. (Fig. 9, *h*.) The major portion of it was dug into the face of the pit wall. The bottom was slightly below the floor level of the room and was separated from it by a plaster ridge which extended from the support post in the corner to the wall at the opposite side of the recess. Except for this feature, there was little difference between the subwall storage place in house E and those in houses A and D of the first group.

The ventilator was of the simple tunneled type. The passage had an upward slant to the shaft at its outer end. The sill of the opening into the room was quite high above the floor level, more so than was generally found to be the case. In this respect it resembled the opening in the ventilator of house D, Group 2. The shaft at the outer end was not very deep. It was roughly circular in outline.

House E measured 8 feet 6 inches (2.59 m.) on a north-south line across the fire pit. On an east-west line the main chamber was 7 feet (2.133 m.) from wall to wall. The alcove was slightly irregular in its measurements. The north wall was 3 feet (91.44 cm.) long and the south 4 feet 5 inches (1.346 m.) from the edge of the room to the ventilator opening. At the latter end the alcove was 2 feet 2 inches (66.04 cm.) wide. Where it opened into the room it had a width of 2 feet 6 inches (76.2 cm.). At the west side of the room the pit had a depth of 3 feet 9 inches (1.143 m.). At the end of the alcove it was 3 feet 6 inches (1.066 m.) deep.

The fire pit measured 1 foot (30.48 cm.) by 9 inches (22.86 cm.), with a depth of 5 inches (12.7 cm.). The deflector stood 7 inches (17.78 cm.) from the fire pit. The stone was 1 foot 2 inches (35.56 cm.) wide, 2 inches (5.08 cm.) thick, and had risen to a height of 1 foot 3 inches (38.1 cm.) above the floor. The supposed ladder pit was oval in contour with diameters of 1 foot 3 inches (38.1 cm.) and 1 foot 9 inches (53.34 cm.). It had a depth of 2 inches (5.08 cm.).

Holes for the support posts ranged from 6 to 10 inches (15.24 to 25.4 cm.) in diameter. Their depths averaged 2 feet (60.96 cm.). The two holes in the floor which suggested that they had been rests for pottery vessels had diameters of 6 and 7 inches (15.24 and 17.78

cm.). Their depths were 3 and 4 inches (7.62 and 10.16 cm.). The smaller hole in which the bone implements and stone pipe were found had a diameter of 3 inches (7.62 cm.) and a depth of 6 inches (15.24 cm.).

The storage recess at the northwest corner of the room extended back into the wall 1 foot (30.48 cm.). Along the wall of the room the opening was 2 feet (60.96 cm.) wide and 1 foot 4 inches (40.64 cm.) high. The floor of the recess was 3 inches (7.62 cm.) lower than that of the room. The adobe ridge which separated the two was 3 inches (7.62 cm.) wide and 2 inches (5.08 cm.) high. The recess at the northeast corner of the alcove was 1 foot 7 inches (48.26 cm.) long, 10 inches (25.4 cm.) wide, and 1 foot 11 inches (58.42 cm.) high. The smaller pocket extending from the larger was 6 inches (15.24 cm.) from the north wall of the ventilator and parallel to the alcove. The pocket was 6 inches (15.24 cm.) wide, 7 inches (17.78 cm.) high, and 9 inches (22.86 cm.) deep. The bottom of this smaller recess was 9 inches (22.86 cm.) above that of the larger one which was on the floor level for the alcove. The southeast recess was 1 foot 9 inches (53.34 cm.) long, 10 inches (25.4 cm.) wide, and 1 foot 4 inches (40.64 cm.) high. The small side pocket extending out from it was 9 inches (22.86 cm.) from the wall of the alcove. It was 6 inches (15.24 cm.) wide, 8 inches (20.32 cm.) high, and 6 inches (15.24 cm.) deep. The bottom was 8 inches (20.32 cm.) above the floor of the larger recess. The latter was also on the same level as the floor of the alcove.

The ventilator opening was 1 foot (30.48 cm.) wide and 1 foot 2 inches (35.56 cm.) high. The sill was 1 foot (30.48 cm.) above the floor of the alcove. The tunnel was 1 foot 9 inches (53.34 cm.) long. At the shaft end the opening was only 1 foot (30.48 cm.) high. The width was greater here than at the room end, however, measuring 1 foot 3 inches (38.1 cm.). The shaft had a diameter of 1 foot 5 inches (43.18 cm.) and a depth of 1 foot 10 inches (55.88 cm.).

The two storage pits of Group 3 were oval in contour. (Fig. 7.) The largest one was located 9 feet (2.743 m.) due south of house A. The pit had been dug into the ground and its walls covered with plaster. There were no indications of a superstructure. It is probable that the covering had been of the conical form previously described. The pit measured 7 feet (2.133 m.) on its long diameter and 5 feet 8 inches (1.727 m.) across the short way. It had a depth of 3 feet 4 inches (1.016 m.). The second pit was 5 feet 6 inches (1.676 m.) slightly east of north from house B. It was much smaller than the other pit, with a long diameter of 4 feet (1.219 m.) and a short one of 3 feet 3 inches (99.06 cm.). The pit had a depth of 2 feet 3 inches (68.58 cm.) below the ground level at the time of the

occupation of the houses. The bottom was 3 feet (91.44 cm.) below the present surface. There were no indications of a superstructure, but the walls were carefully plastered. When opened, during the process of the investigations, the pit contained the skeleton of an adult, probably an intentional burial. No mortuary offerings accompanied the remains, however.

There was only one exterior fire pit in conjunction with the houses. It was located between, but slightly to one side of, the pit which contained the burial and the oval chamber of house C. The pit was deeper than was usual for such fireplaces and was lined with stone slabs. Two of these stones were metates which had become too thin for further use in grinding meal. The bottom of the fire pit was 1 foot 6 inches (45.72 cm.) below the original ground level. The diameter measured 2 feet (60.96 cm.) on one line and 2 feet 3 inches (68.58 cm.) at right angles to it.

The refuse mound of the group was located in the "L" formed by the houses. It was south of the main row of structures, A to D, and east of E. (Fig. 7.) The general characteristics were similar to those of the other mounds, except for the fact that no burials were found in it. The full extent of the deposit could not be determined accurately because its eastern edges had been encroached upon and partially covered by a sand dune. Judging from exploratory trenches, the refuse had approximately covered the area indicated on the plat of the group. The mound had a length of 26 feet (7.925 m.) and a width of about 20 feet (6.096 m.). Its greatest depth was a little south of the center, where there were 2 feet 6 inches (76.2 cm.) of house sweepings, ashes, sand, broken pottery, stones, and bones.

The two rectangular structures on the ground level will not be discussed in connection with the dwellings of Group 3. They will be considered in connection with the remains of similar houses in a short section following that of the pit houses.

GROUP NO. 4

This cluster of dwellings consisted of four houses, two storage pits, and a refuse mound. The group was located 450 feet (137.16 m.) northeast from Group No. 1. As mentioned in the introduction to the subject of pit houses, only one of these was completely excavated. Half of another house was cleared of its accumulated débris, while the outlines of the other two were merely traced. This group was of exceptional interest because a portion of the refuse mound from the pueblo completely covered the remains of two of the houses. That this material was of later date was conclusively shown by the fact that the pits of the dwellings had

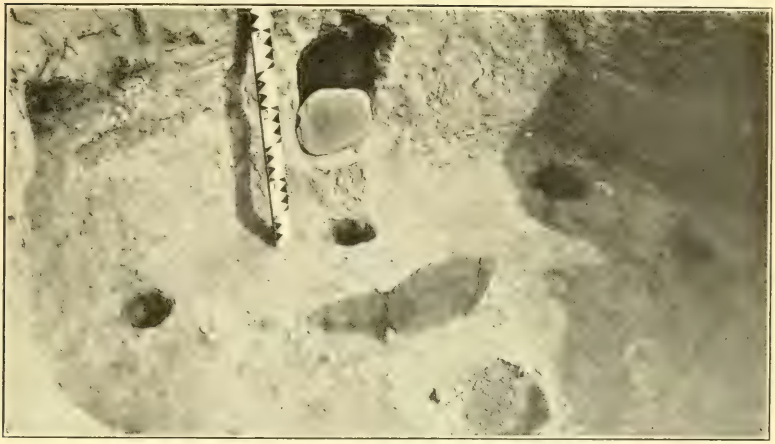
become entirely filled with accumulated débris and windblown sand before the first rubbish from the large ruin had been deposited there. The evidence of the chronology thus revealed was additional corroboration for the subsequent erection of the pueblo. It augmented the stratigraphy found in the combination of the large ruin and the underlying pit house.

House B of Group 4 was the structure which was completely excavated. It was interesting in a number of ways. The general characteristics were quite comparable to the remains of the dwellings in Group 1, but it had a few features which were distinctly individual. The pit was one which might be considered as approximately oval in contour, although the arcs on the northeast and northwest sides were considerably flattened. (Fig. 10.) The encircling bench was quite broad and well defined. It had been dug into the earth in the same fashion as those in the structures of Group 1. There was one feature in connection with the bench, however, which was unique for this site. Along the entire ventilator side of the room its top was several inches higher than on the other three sides. (Pl. 6, *c*.) The change in level was not the result of a gradual slope but a distinct and intentional break. Although this was the only example of a raised section in the bench of a house found at the Long H Ranch, it has been observed in pit dwellings in other districts of the Southwest. In several of the houses of the Basket Maker III village uncovered in the Chaco Canyon the feature was especially pronounced.[44] One of the pits in the latter group showed distinctly that the raised portion was built during a process of house remodeling which took place at some time subsequent to the original building on the structure. This suggested that there was an amplification and fuller development of the feature in the later stages of Basket Maker III house construction. This emphasis of the raised bench section seems to have attained sufficient importance to carry it over, to some extent, even into subsequent periods.

What significance may have been attached to the raised section of the bench is not known. There are certain indications that it might represent the beginning of one of the characteristics of some of the later ceremonial chambers. Many archeologists have long believed that the circular kivas of the Southwest were a ceremonial survival of the old original type of dwellings. For years this was largely theory, but recent work in the older forms of houses has produced considerable support for such an argument.[45] The marked similarity between the pit dwellings and the ceremonial chambers of

[44] Roberts, 1929, pp. 21, 64–65, 70.

[45] For a more complete consideration of this problem see Roberts, 1929, pp. 81–90.

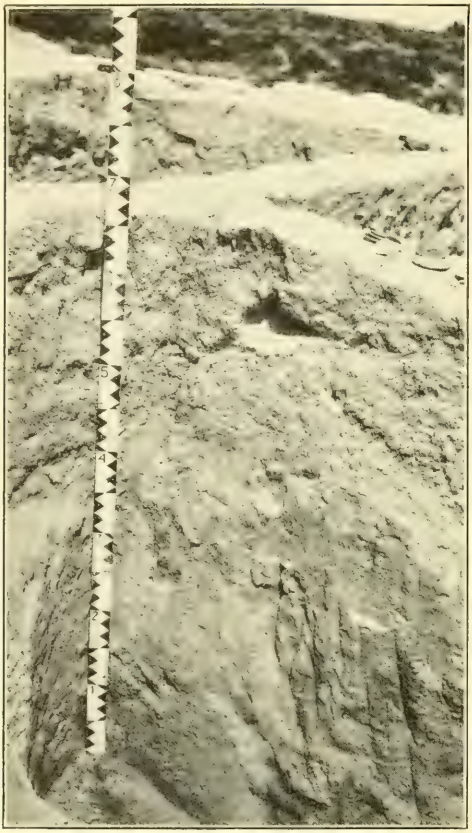


a. House D, Group 3

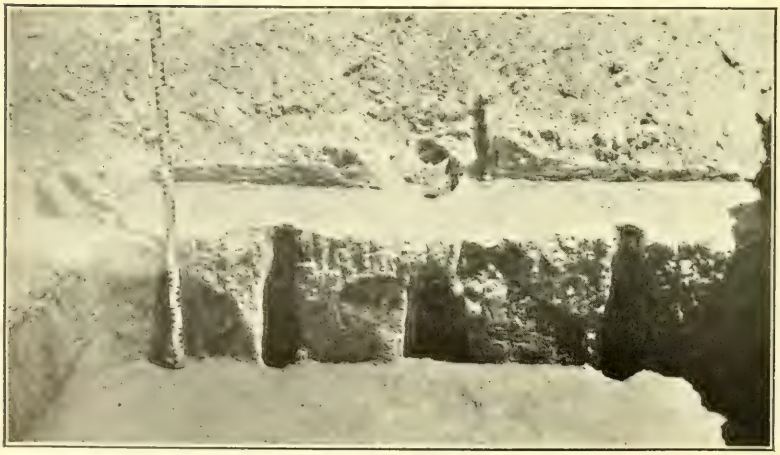
b. House E, Group 3

c. House B, Group 4

PIT HOUSES

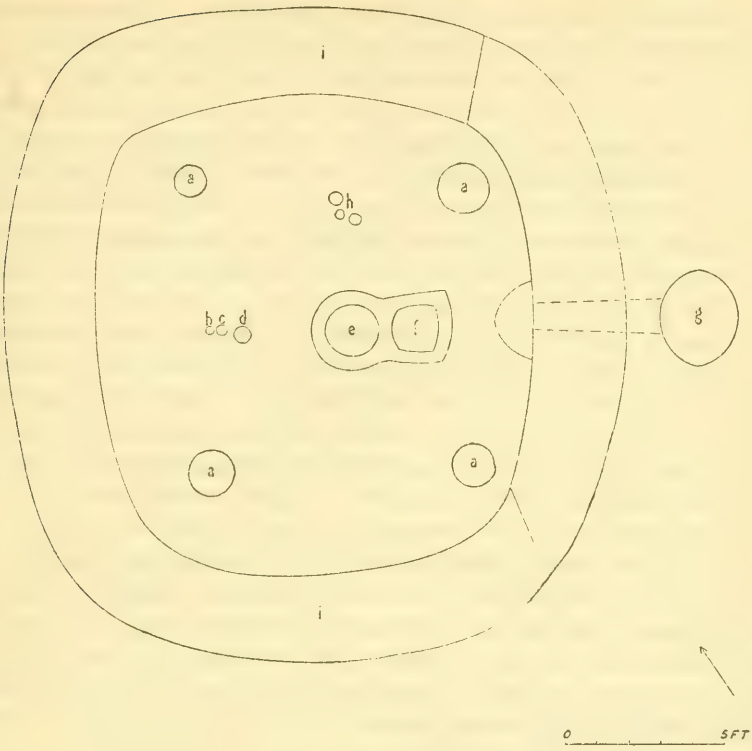


a. Pit dwelling beneath walls of ruin



b. Ventilator side of kiva B

DETAILS IN PUEBLO



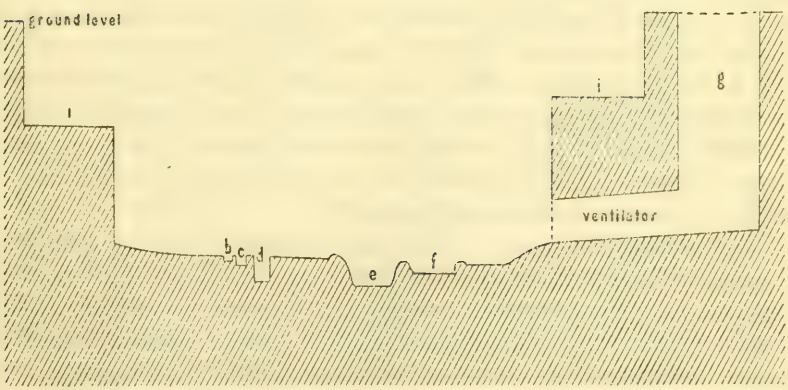


FIGURE 10.—House B, Group No. 4: *a*, Holes for main support posts; *b*, *c*, *d*, holes in floor in position for sipapu; *e*, fire pit; *f*, ladder pit; *g*, ventilator shaft; *h*, holes in floor, possibly storage places; *i*, bench

later periods will become apparent when the kivas of the pueblo ruin are discussed. For the present it will suffice to call attention to the ventilator niche or recess present in so many of the ceremonial structures.[46] Such a feature may well have been the outgrowth of an idea that certain emphasis should be placed on the bench at that side of the room, a distinction which is exemplified in house B of Group 4 and the Basket Maker III structures of the Chaco Canyon.

The superstructure of house B was probably similar to those on the other larger structures. It had had four posts to support the framework and the sloping timbers probably extended from the back of the bench to the stringers on the uprights. The only place where there would have been a difference was along the side where the bench was higher. The change in level was not sufficiently marked, however, to cause any difficulty. The jog in the roof framework resulting from the variation in the bench would not have been great enough to require any special construction to bridge the gap. The brush and reeds covering the larger timbers would readily have conformed to the difference in slope.

The fire and ladder pits in this structure were combined in the same way as those in the other large houses. The fire pit was roughly circular in form. The rest for the lower end of the ladder had curved sides, but they met in distinct corners and the pit gave the impression of a quadrilateral box. The two pits were inclosed in a bordering rim of adobe plaster.

House B was amply supplied with sipapus. Instead of the usual hole in the floor between the fire pit and the northwest side of the room, this structure had three. Curiously enough they were rather regular in their alignment and were graded in size and depth. That nearest the fire pit, which under ordinary circumstances would be considered the actual sipapu, was the largest, the one located in the middle was the next in point of size, and that farthest from the fire pit was the smallest. Why the two additional holes were present is not known, although such a combination is occasionally found in structures of this type. At the northeast side of the room was a group of three holes (fig. 10, *h*), which probably were used as pockets in which to store small objects.

The ventilator in house B was a combination of the two forms of construction previously described. It was both tunneled and built up. The first work in making the element was to dig a large tunnel, not a trench, through the bench. The opening was then reduced in size by the erection of a framework in the fore part. The timbers were covered with plaster and earth and then the front

[46] Fewkes, J. W., 1911 a, pl. 13, p. 21. Kidder, A. V., 1924, fig. 12, p. 69. Prudden, T. M., 1914, fig. 4, p. 45.

of the larger opening filled in and plastered over. A low step of plaster was placed in front of the reduced aperture. The remainder of the passage was an actual tunnel. The shaft at the outer end was oval in outline. The long diameter was at right angles to the passage line.

House B measured 13 feet 8 inches (4.165 m.) inside the bench on the fire pit, ventilator line. Above the bench it was 19 feet 5 inches (5.918 m.) in diameter. At right angles to the preceding diameter it was 15 feet (4.572 m.) below the bench and 20 feet 6 inches (6.248 m.) above it from wall to wall. At the ventilator side of the room the floor of the pit was 7 feet 9 inches (2.362 m) below the ground level. Due to an upward curve in the floor at the opposite side of the room the depth was only 7 feet 3 inches (2.209 m.) below the surface. The bench had an average width of 2 feet 9 inches (83.82 cm.). At the ventilator side of the room its top was 4 feet 11 inches (1.498 m.) above the floor. At the opposite wall the height was 3 feet 7 inches (1.092 m.). The difference in level at the northeast end of the raised portion was 1 foot 8 inches (50. 8 cm.) and at the southeast end 1 foot 6 inches (45.72 cm.).

The fire pit was 1 foot 7 inches (48.26 cm.) and 1 foot 8 inches (50.8 cm.) in diameter. Its bottom was 10 inches (25.4 cm.) below the floor line. With the addition of the bordering rim the total depth of the pit was 1 foot (30.48 cm.). The ladder pit measured 1 foot 5 inches (43.18 cm.) by 1 foot 6 inches (45.72 cm.). Its floor was 3 inches (7.62 cm.) below that of the room. The added 2 inches (5.08 cm.) of the rim gave it a total depth of 5 inches (12.7 cm.).

The largest of the three holes in the position normally occupied by the sipapu was 1 foot 10 inches (55.88 cm.) from the edge of the fire pit rim. The hole had a diameter of 6 inches (15.24 cm.) and a depth of 10 inches (25.4 cm.). The second hole was 3 inches (7.62 cm.) from the first. It had a depth of 4 inches (10.16 cm.) and a diameter of 3½ inches (8.89 cm.). The smallest of the three was 1 inch (2.54 cm.) from the middle one. Its diameter was 3 inches (7.62 cm.) and its depth 2 inches (5.08 cm.). The three holes in the northeast section of the floor had diameters of 3, 4, and 5 inches (7.62, 10.16, and 12.7 cm.). Their depths were 9, 7, and 7 inches (22.86, 17.78, and 17.78 cm.), respectively.

The holes for the support posts varied in size. That at the north had a diameter of 1 foot (30.48 cm.), the east hole was 1 foot 7 inches (48.26 cm.) across, the south mold was 1 foot 4 inches (40.64 cm.) in diameter, and the one at the west 1 foot 5 inches (43.18 cm.). Their distances from the wall were not consistent. The north post was 1 foot 6 inches (45.72 cm.) from it, the east and south ones had been 8 inches (20.32 cm.) from the face of the bench, and the west

pole stood 1 foot 11 inches (58.42 cm.) from the wall. The depths of the holes ranged from 2 feet 3 inches (68.58 cm.) to 2 feet 6 inches (76.2 cm.).

The ventilator opening had a height of 1 foot 4 inches (40.64 cm.) and a width of 10 inches (25.4 cm.). The sill of the aperture was 6 inches (15.24 cm.) higher than the floor of the room. The step in front of the opening projected into the room 1 foot 3 inches (38.1 cm.). The ventilator tunnel was 4 feet (1.219 m.) long. The opening at the outer end was 1 foot 5 inches (43.18 cm.) high and 1 foot 2 inches (35.56 cm.) wide. The shaft was 3 feet (91.44 cm.) in diameter at right angles to the passage line. Along the latter it measured 2 feet 6 inches (76.2 cm.). The shaft had a depth of 6 feet 9 inches (2.057 m.).

House C of the same group had been of the characteristic large dwelling form. The pit had been oval in shape and had had an encircling bench. The latter did not have a raised portion like that in B. Although the remains were not completely excavated, enough was done to show that it had been a typical house. The most interesting feature connected with it was the depth of the refuse from the pueblo. The floor of the pit at that point was 9 feet (2.743 m.) below the surface. Two feet (60.96 cm.) consisted of accumulated rubbish from the later village. The original pit had been 7 feet (2.133 m.) deep. The top of the bench was 4 feet (1.219 m.) above the floor. The pit itself had a diameter of 10 feet 10 inches (3.302 m.) on the ventilator, fire pit line inside the bench. Above the bench it measured 15 feet 8 inches (4.775 m.). Across the other way the diameter inside the bench was 12 feet (3.657 m.). Above the bench it measured 17 feet (5.181 m.).

The storage pits for the group were similar to those previously described. The larger one was 5 feet 6 inches (1.676 m.) on its long axis and 4 feet 10 inches (1.473 m.) on the short. It was 1 foot 6 inches (45.72 cm.) deep. The smaller pit was 4 feet (1.219 m.) long and 2 feet 6 inches (76.2 cm.) across. Its average depth was 2 feet (60.96 cm.).

The refuse mound was located southeast of the group of houses. It was of the usual type. The contents consisted for the most part of ashes, sand, broken stones, bones, and potsherds. The material had been deposited on a slight slope which dropped away from the houses. The mound contained a number of burials. There had been some digging in it previous to the work of 1929 and some of the interments had been removed. All of the skeletons which were uncovered during the recent investigations were accompanied by mortuary offerings of pottery and ornaments.

ISOLATED PIT HOUSES

One of the small pit dwellings which did not appear to have been attached to any particular group was located 140 feet (42.672 m.) from the Group 3 center. The structure had been quite characteristic of the small type. It had a fairly circular pit, although there was a distinct flattening of the arc on the ventilator side of the chamber. (Fig. 11.) There were no indications of a bench. The

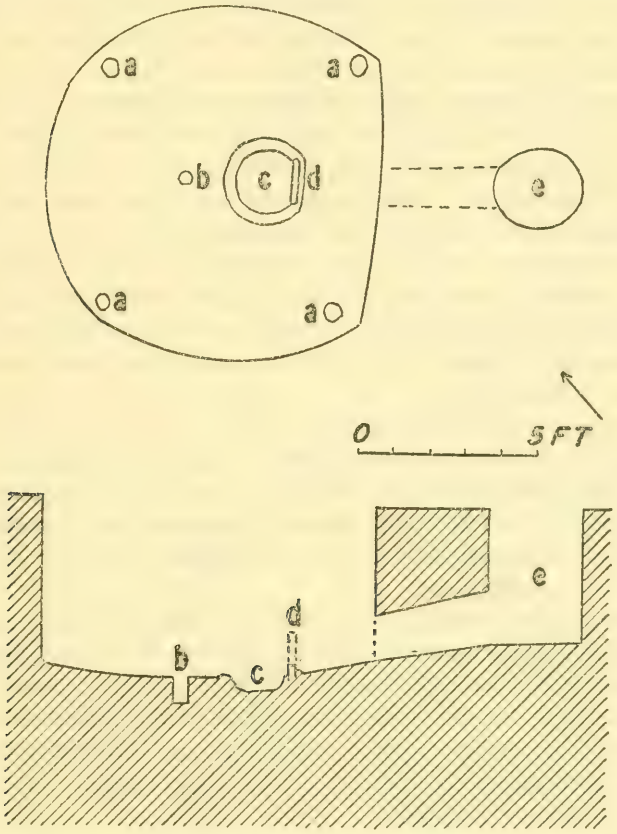


FIGURE 11.—Plan of isolated small pit dwelling: *a*, Holes for main support posts; *b*, sipapu; *c*, fire pit; *d*, deflector; *e*, ventilator

pit was comparatively deep. The superstructure had probably been of the general form postulated for the small dwellings. That it had been supported by four upright posts was definitely shown in the holes where they had been embedded. The latter showed a unique feature, however, in that they slanted inward at an angle of 25° from the vertical. Judging from this the poles must also have sloped toward the center of the roof. This would have given the interior

of the structure a different appearance from the others. The slant would not have had any material effect on the superstructure beyond the fact that it would have made possible the use of shorter stringers on the uprights.

The fire pit near the center of the room was circular in form and had an encircling rim of adobe plaster. The deflector had been embedded in this ridge. One face of the stone was flush with the interior surface of the fire basin. There was no ladder pit. The surface of the floor between the deflector and the ventilator opening was abraded to a certain extent and the base of the device for entering and leaving the chamber had probably rested there.

There was a distinct sipapu in the proper position in the floor at the side of the fire pit opposite from the ventilator. There were no additional holes beyond the sipapu and those in which the support posts had been placed. The occupants had apparently felt no need for depositories in which to place minor objects.

The ventilator was of the simple tunneled variety. The sill of the opening was on a level with the floor of the room and there was no plaster frame or "apron" around the aperture. The tunnel sloped slightly upward to the bottom of the shaft. The latter was oval in contour and fairly deep.

The diameter of this structure on the sipapu, fire pit, ventilator line was 9 feet 3 inches (2.819 m.). Across the opposite way it was 9 feet 10 inches (2.997 m.) from wall to wall. The pit was 4 feet 8 inches (1.422 m.) deep at the side opposite the ventilator. In front of the opening it was 4 feet 3 inches (1.295 m.) from the floor to the ground level.

The fire pit had diameters of 1 foot 6 inches (45.72 cm.) and 1 foot 9 inches (53.34 cm.). The depth was 6 inches (15.24 cm.). The inclosing rim around the pit had an average width of 4 inches (10.16 cm.) and a height of 2 inches (5.08 cm.). The deflector stone was 1 foot 4 inches (40.64 cm.) wide, 2 inches (5.08 cm.) thick, and, from the indications of the fragments, had risen 1 foot 2 inches (35.56 cm.) above the floor.

The sipapu was 9 inches (22.86 cm.) from the edge of the fire pit rim. The hole had a diameter of 4 inches (10.16 cm.). Its depth was 9 inches (22.86 cm.). The holes for the support posts ranged from 4 to 6 inches (10.16 to 15.24 cm.) in diameter. The posts had been set at a depth of 2 feet (60.96 cm.). They had stood from 3 to 6 inches (7.62 to 15.24 cm.) from the walls.

The opening into the ventilator was 1 foot 3 inches (38.1 cm.) high and 1 foot (30.48 cm.) wide. The tunnel was 3 feet 3 inches (99.06 cm.) long. At the shaft end the opening was 1 foot 6 inches (45.72 cm.) high and 1 foot 3 inches (38.1 cm.) wide. The shaft

diameter on the passage line was 2 feet 6 inches (76.2 cm.) At right angles to the foregoing it measured 2 feet 3 inches (68.58 cm.). The bottom of the shaft was 3 feet 8 inches (1.117 m.) below the surface of the ground.

The pit remains which were found under the northeast end of the pueblo ruin were of the small dwelling type. (Pl. 7, *a*.) The excavation for the subterranean portion was roughly circular in outline and there was no bench. The superstructure had been supported on four posts and it is probable that taken as a whole the covering which roofed the pit had been similar to those described for the other small dwellings.

It was not possible to determine what all of the interior furnishings were because it was not practicable to remove all of the fill in the pit. To have done so would have necessitated the destruction of some of the walls of the overlying pueblo. The room did contain a circular, saucer-shaped fire pit. There were no indications of a ladder pit and it was not possible to discover whether a deflector stone had stood between the fire pit and the ventilator opening. Except for the post placements, there were no holes in the sections of the floor which were uncovered. If the room had a sipapu the latter was under the portion of the fill upon which the pueblo crosswall rested.

The ventilator was of the tunneled variety. The aperture was on the floor level of the chamber. There was a slight upward slant to the passage. The shaft at the outer end was oval in contour and fairly large. It was comparatively shallow and large enough to have served as an actual entrance chamber. The passage was not particularly large, but a person could have crawled through it.

The pit of the structure measured 9 feet 6 inches (2.895 m.) on the diameter along the fire pit and ventilator line. Across the opposite way it was 10 feet (3.048 m.) from wall to wall. At the ventilator side of the room the floor was 3 feet 8 inches (1.117 m.) below the old ground level. At the opposite side it was 4 feet (1.219 m.) deep.

The ventilator opening was 1 foot 6 inches (45.72 cm.) high and 1 foot (30.48 cm.) wide. The passage was 4 feet 3 inches (1.295 m.) long. The opening at the outer end, where it joined with the shaft, was 1 foot 6 inches (45.72 cm.) high and 1 foot 6 inches (45.72 cm.) wide. The shaft had a diameter of 4 feet (1.219 m.) on the passage line. At right angles to it the diameter was somewhat less, measuring only 3 feet (91.44 cm.). The bottom of the shaft was 2 feet 6 inches (76.2 cm.) below the old ground level. In this respect it differed quite a little from those in the other small dwellings.

Another example of an isolated house was found between Groups 1 and 3. It was 130 feet (39.624 m.) from the first cluster of dwell-

ings. The structure was unique. It was the only one of its kind found during the progress of the investigations. Whether it was purely an individual variation due to some fancy on the part of the builders or represented a form of dwelling which resulted from an even greater breakdown of custom than was observed in some of the Group 2 houses could not be determined. It had an oval pit which was very shallow when compared to those for the other dwellings. There was no sipapu, no ladder pit, no deflector, and no ventilator. In fact, most of the common features of the usual form of pit house were missing.

The superstructure had been supported on four posts set into the floor against the walls of the excavation. The lower ends of the slanting side poles had been embedded in the earth several inches back from the edge of the pit. This in effect provided the interior with a narrow bench. This form of bench, however, can not be considered comparable to the type found in the larger structures where it was formed by an actual digging into the earth. The only interior feature in the house was a circular fire pit in the center. This pit was only a shallow basin in the floor and had no encircling rim. When the accumulated débris was removed from the interior of the house pit the fire basin was filled with wood ashes which remained from the time when it had been in actual use.

The pit for this structure had a north-south diameter of 10 feet (3.048 m.). Along the east-west line it measured 9 feet (2.743 m.). The depth did not vary perceptibly from the 1 foot 4 inches (40.64 cm.) average. The fire pit was 1 foot (30.48 cm.) in diameter and 3 inches (7.62 cm.) deep.

A few feet east of the structure were the remains of two oval storage pits. One of these contained a burial. These pits had depths of 2 feet (60.96 cm.) and 2 feet 6 inches (76.2 cm.). The shallower one measured 3 feet (91.44 cm.) by 2 feet 6 inches (76.2 cm.). The deeper one had diameters of 3 feet 8 inches (1.117 m.) and 3 feet (91.44 cm.).

Jacal Structures

The problem of the jacal dwellings at the Long H Ranch presents the most unsatisfactory phase of the summer's work. As stated in the introduction to the subject of house remains, the results obtained from the investigations of mounds where such structures had stood were highly disappointing. That this form of dwelling had existed was plainly evidenced by the large blocks of burned adobe in the débris. These lumps of fired clay bore the imprints of the wooden poles used in the construction. The destruction and disintegration of the house materials had been so complete, however, that it was

practically impossible to obtain detailed information concerning the nature of the dwellings. At three locations there was just enough to suggest that they had been quite comparable to a similar type of house found in southern Colorado. One of these had been in the third pit house group, the second was adjacent to the mound where the caliche layer had formed over the trench dug by earlier investigators, and the third was 150 feet (45.72 m.) northwest of Group 4.

Judging from what little evidence there was, the houses of this type had been built entirely above ground. There were no indications whatever of a pit or depressed floor. They were 4-sided, more trapezoidal than rectangular in form, since the corners did not appear to have formed right angles, and flat roofed. The walls apparently consisted of series of upright poles, set at intervals of several inches, between and around which puddled adobe was placed. The fragments of plaster gave no indications of wattling, the interweaving of smaller sticks in the framework of upright posts, so that the walls must really have been mud reinforced by timbers. In the ruins in Group 3 these wall posts seemed to have been placed in a shallow trench. What evidence there was suggested that the butt ends had been held in position by adobe mud and stone wedges. Unfortunately, not enough remained of these trenches to show clearly the extent of the house. Enough traces were found to warrant the belief that it had been approximately the size indicated in the plat for Group 3 (fig. 7), but of this there was no absolute certainty. The house probably had had only a single room and near its center a fire pit. The latter was well preserved and for some distance on all sides of it the plaster floor was fairly good. There was nothing to show what kind of a door the structure had had. Whether the means for entrance had been through the smoke hole in the roof or whether there had been a doorway in the side of the structure could not be determined.

The remains of the other two structures indicated a somewhat different method of construction in that the wall poles seemed to have been embedded in the earth instead of being set in a trench. Both of these dwellings had covered sufficient ground to imply that they had consisted of a number of rooms, probably three or four. Nothing further could be learned concerning their characteristics.

Houses of pole and plaster construction have been found in the Piedra and La Plata districts in southern Colorado. Conditions at these sites were more favorable for the preservation of evidence, and as a result a fairly accurate picture of the type of dwelling was obtained. In erecting these structures the builders constructed a framework of heavy posts and stringers. The uprights were usually set into the ground at the corners of the house. When the dwelling

was unusually long, additional supports were employed in the side walls. Smaller poles were set at intervals in a shallow, narrow trench which was dug on a line between the main uprights. The lower ends were wedged tight by the use of stones and mud. The upper ends rested against the heavy stringers. Whether the wall timbers were actually attached to the latter or merely leaned against them is not known. The roof was flat. It was formed by a series of poles extending across the stringers. Small sticks, reeds, and brush rested upon the roof poles. The entire framework was then covered with adobe mud. The latter was applied between and around the wall poles in such a fashion that the wood was almost entirely covered by the plaster. Houses of this type had one or several rooms.[47] The meager evidence in the Long H remains pointed toward this form of construction.

Variations of the jacal type of house were quite widespread in the Southwest and have been used over a long period of time. There is no question but what they have existed from the Pueblo I period down to the present day. The Pima and Papago still erect their own variations of the type[48] and even the Mexican and American settlers have their forms. In certain sections of northern New Mexico homesteaders are living in houses built in practically the same way as those described for southern Colorado of many centuries ago.

The jacal sites gave every indication of having been contemporaneous with the large pit houses. There are no distinguishable differences in the pottery and other objects associated with the two forms. In all likelihood some families were living in one type of structure at the same time that others occupied the other form. There is, of course, the possibility that the jacal houses were summer habitations and the pit dwellings occupied in the winter. The use of seasonal houses is a common practice among certain groups in the area. There was no evidence either for or against such a belief and the idea is merely offered as a suggestion. At first it was thought that the jacal remains might have been the ruins of the actual domiciles while the subterranean chambers were ceremonial rooms. There was too great a discrepancy in the proportion, however, as the pit dwellings outnumbered the other forms. This was not only true for the remains actually investigated, but was evidenced in the many mounds not excavated. The ratio should have been several pole and mud houses for each pit if the latter had been the religious structure. The jacal house was the outstanding form in the Pueblo I period in the northeastern San Juan region and there is no reason why it should not have begun to appear in this section

[47] Morris, E. H., 1919 b, p. 187. Roberts, 1930, pp. 36–38.
[48] Lumholtz, C., 1912, p. 7. Anonymous, 1929, p. 48.

and have existed contemporaneously with the pit forms. The latter unquestionably survived for a longer time in the southern parts of the area than in the north.

The remains of the adobe structure partially overlying the débris-filled pit of house D in Group 3 presented a problem equally as difficult as that of the jacal structures. Beyond the fact that a single-roomed domicile whose walls had been made of mud had existed, little could be learned. It unquestionably was later than house D. Whether it was contemporaneous with the jacal dwellings and the larger pit structures or of later date could not be satisfactorily determined. The few potsherds lying on its floor were of the general types associated with the pit and jacal remains. These fragments could have been carried into the house by children from a near-by refuse mound at a much later date. Since there were no pieces from subsequent periods in the lot there is not much likelihood that the house represents a stage comparable to that of the pueblo ruin. It is possible that a dwelling had been built without reinforcing poles in the wall during the early period of the occupation of the site. If such was true and the adobe structure was contemporaneous with the jacal forms, then house D of the pit group represented a still older phase. The latter was more nearly like the type of house belonging to Basket Maker III than it was to the larger pit houses. Since it may have represented a transition between the two forms it is quite possible that it was abandoned and had become filled in before the full development of the larger style of pit dwelling.

The evidence is not sufficient to warrant a definite statement, but the most satisfactory suggestion which can be made on the basis of all of the factors involved is that a certain progression in house types is represented. House D of Group 3, representing a stage midway between the Basket Maker III and normal Pueblo I dwellings, probably was the oldest. After this the larger, bench-encircled type of semisubterranean house appeared. While the latter was still the common form jacal dwellings were introduced. Proficiency in the construction of the latter and a somewhat limited supply of available timber led to the experiment of building without reinforcing poles in the walls. Thus the adobe form of house evolved. No great amount of time need be postulated for the change and development in the houses. It is true that a comparatively thick layer of caliche extended across the fill in the pit of house D and formed the level on which the adobe structure rested. It has been shown, however, that caliche forms very quickly in this region. The interval between the abandonment of D and the erection of the adobe house, the stage

during which the larger pit houses and jacal dwellings were built, would have been ample for the appearance of the stratum. On such grounds the contemporaneity of the adobe, jacal, and large pit houses need cause no concern.

The Pueblo Ruin

The remains of the large communal house which occupied a position on a low knoll between Groups 1 and 4 of the pit houses furnished one of the interesting features of the summer's work. As previously stated, it was not planned to conduct any excavations in this ruin at the start of the season. Finally it was decided that the possibility of some stratigraphic evidence concerning its relation to the pit houses warranted a cursory investigation. Even then there was no intention of cleaning out the entire ruin. The preliminary excavation had not progressed very far, however, before it became quite evident that an unusually clear-cut story of the growth and changes in a communal dwelling could be secured by a thorough study of the remains. As such an opportunity is not always present it was determined to make the best of it and the entire ruin was excavated.

The pueblo when finally uncovered showed that it was the remains of a compact, roughly L-shaped building of 45 secular rooms, 4 irregular inclosures, and 4 ceremonial chambers or kivas. (Fig. 12.) As will be observed from the plan of the ruin, the structure would have been fairly extensive had it been entirely occupied at one time, but such had not been the case. All of the rooms were not contemporaneous. The building, like many others in the Southwest, had not been erected from a preconceived plan. It had grown by degrees. Additional rooms and units were added from time to time when needed.

This growth was one which may be attributed to a number of factors. An increase of population resulting from births within the group or accretions from outside sources would have necessitated more housing facilities. The additions from the outside might have been due to the acquiring of husbands by the daughters of the community, if it may be supposed that the custom of the man going to live with his wife's family prevailed at that period, or to other people being invited to join the original settlers. Another agent which was always operative was that of deterioration. When a room or section of the dwelling reached a stage where considerable repairs were required the occupants frequently built a new series of rooms instead of trying to remodel the old ones. Another occasional reason for the erection of new compartments was destruction by fire. Several parts of the pueblo showed the results of such damage. The abandoned rooms were generally used as dumping places for village refuse. A number in this structure were filled with ashes

and rubbish of all kinds, showing that they had functioned in such a capacity.

From the evidence of abutting walls and variations in floor levels it was possible to determine the different stages in the development

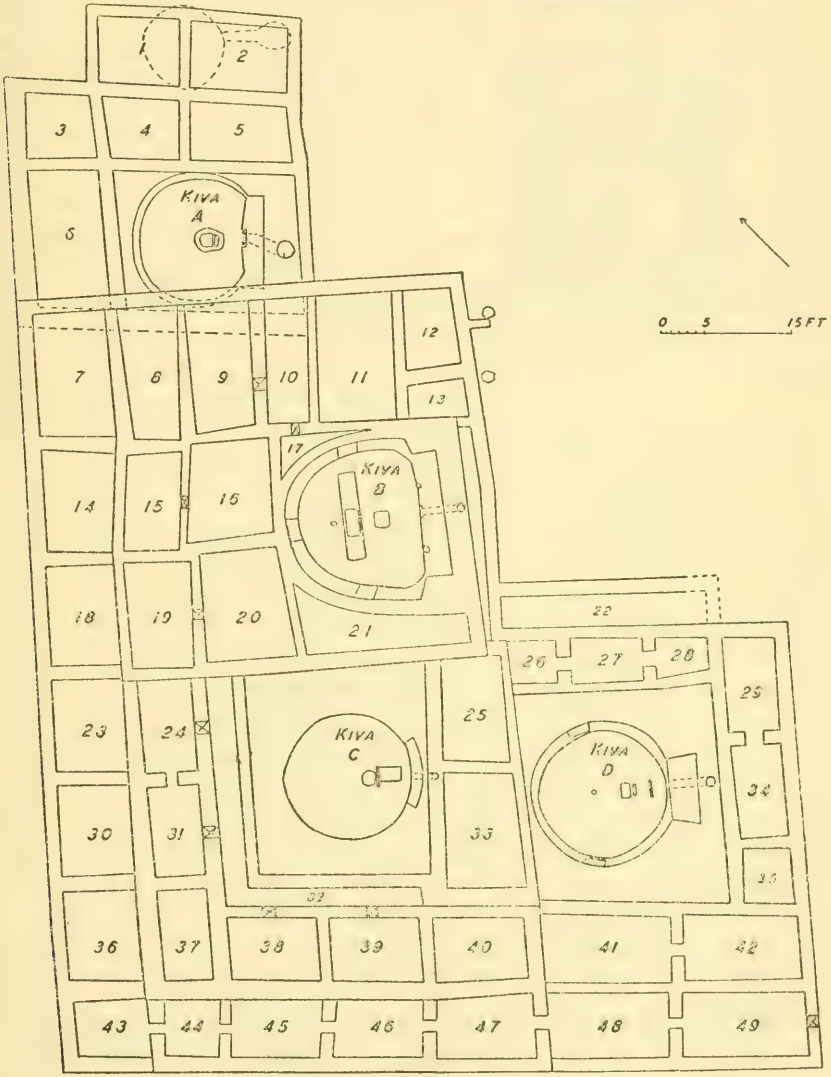


FIGURE 12.—Plan of complete pueblo ruin

of this pueblo. The first unit, the beginning of the communal dwelling, had consisted of a group of six rooms and a circular ceremonial chamber located at what eventually became the extreme northeastern end of the large building. (Fig. 13.)

The walls throughout this small structure had consisted in large part of adobe. An occasional stone had been used, but there was no attempt at true masonry. Such rocks as were employed had not

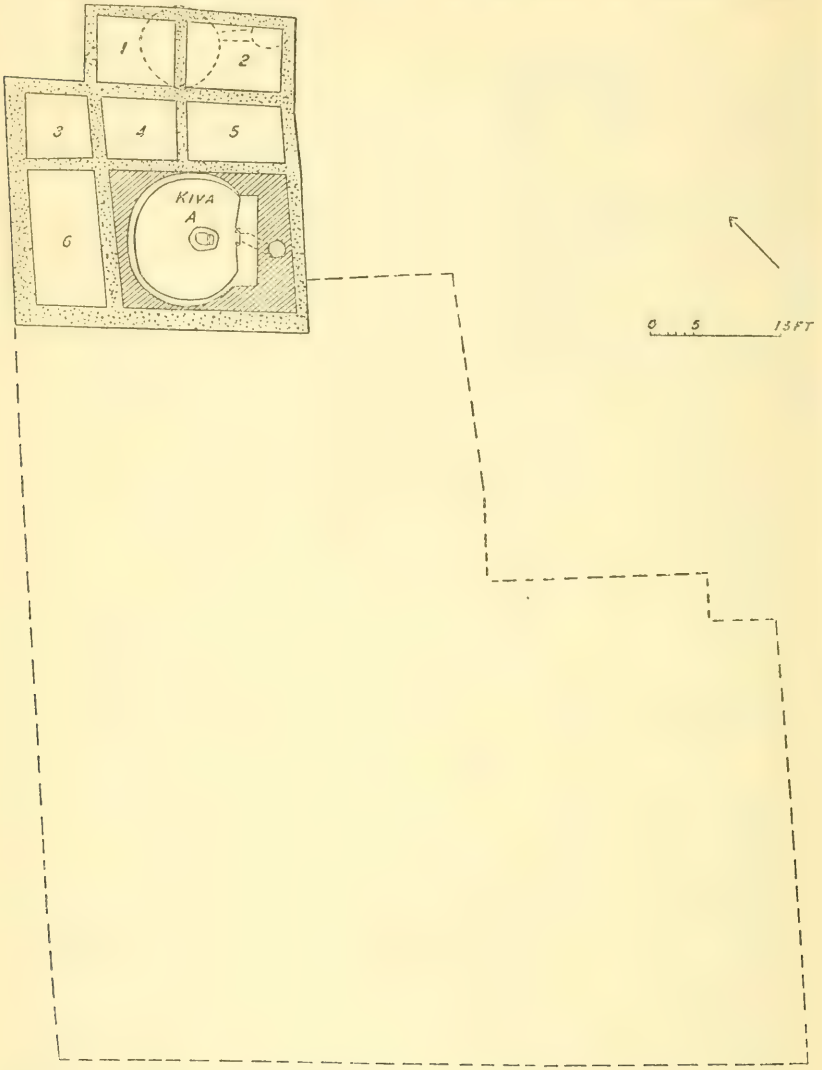


FIGURE 13.—First unit built in pueblo structure. Ultimate extent of building shown by broken lines

been worked and were merely placed here and there in a hit-or-miss fashion. The adobe was not shaped into bricks, but seemed to have been applied in the form of nodules of about the size that could be conveniently held in a person's two hands. As each nodule was put into place it was molded and patted down. A wall of this type

was probably allowed to dry before the cracks were filled in with clay. After the latter had set a final wash or plaster was applied over the entire exterior surface. Walls of this kind are erected along the Rio Grande by some of the modern Pueblos and ruins in that region have shown a similar method of construction.[49]

Beyond the fact that the remains of a pit house was beneath 1 and 2 (pl. 7, *a*), there was little of interest in the secular rooms. All were rectangular in shape and had no interior furnishings. There were no fire pits in any of them. Beneath the floor and partially underlying the outside wall of room 6 (fig. 13) there was a deep groove or ditch which antedated the building of the house. It had not been used by the occupants of the room as it had been filled before the wall was erected and the floor laid down. The ditch was not natural, as it showed clearly the marks of digging implements. At about the center of the space bounded by the room and on the same level as the trench was a circular fire pit. It, too, was beneath the floor. Both fire pit and trench had probably belonged to the pit house occupation of the site.

The kiva or ceremonial chamber was of interest. The room had been partially but not wholly subterranean. From the top of the bench to the floor the walls were below the ground level. The upper portion had been built up in the same manner as the rest of the house. The curved upper wall was erected around the pit just far enough from its edges to provide for a narrow bench. The space between the rounding wall and the rectangular room which enclosed it was filled with earth. The chamber had a flattened arc on the ventilator side which gave it a D shape. This apparently was a survival of the similar feature observed in the pit houses. The bench broadened at the ventilator side until it became a distinct niche or recess. There was nothing to indicate the type of roof. It may have been flat or of the cribbed variety like those of the region to the north.[50] There had been no interior upright posts such as were noted in the pit houses and there were no pilasters or piers rising from the top of the bench to support the roof. Hence the timbers used in the covering must have rested on top of the walls. For this reason it seems more likely that the roof was of the flat variety, possibly similar to that described for Scaffold House in northeastern Arizona.[51]

The interior furnishings were simple in the extreme. At the center of the chamber was a combination fire and ladder pit. The container for the fire was roughly oval in form, while the other pit

[49] Jeancon, J. A., 1923, pp. 11–12.
[50] Fewkes, J. W., 1909, pls. 14, 15; 1911 a, pl. 14. Nordenskiöld, G., 1893, fig. 31.
[51] Fewkes, J. W., 1911 a, p. 19.

was a narrow rectangle. This suggested that the runged form of ladder had been used. A stone slab separated the two pits and both were enclosed by a bordering ridge of adobe. The kiva did not have a sipapu and there presumably had never been a deflector, unless the slab separating the two pits had risen to a height sufficient to serve in that capacity. Its top was not worked and showed that it had been broken off. There were no fragments in the pits. Consequently, it was not possible to tell whether the stone was placed in position in the form found or had been broken during the occupancy of the kiva and the pieces disposed of previous to the abandonment of the chamber.

The ventilator had been constructed in a manner similar to some of those in the larger pit houses. The horizontal passage had been dug as a trench. The top was covered over with poles and brush upon which the plaster rested. The opening into the room was reinforced by a wooden frame consisting of two upright posts and a cross pole. These timbers were placed in an offset around the opening. The lower portions of the uprights were still in position and decayed fragments of the cross pole were clinging to the plaster. The flue or shaft had been built up before the space between the kiva and the outer walls had been filled in. This apparently was accomplished by the erection of a roughly circular wall of adobe. The alignment was bad, as will be observed from the plat of the unit, and the tunnel connecting the shaft with the room had to be set at a considerable angle. The floor of the passage sloped upward to the bottom of the shaft.

One of the interesting things observed in the kiva was the fact that it was possible to count nine distinct coats of plaster on its walls. It can not be definitely assumed that the "ancients" had the same customs as their modern descendants but the probabilities are that many features of the recent cultures are survivals from earlier periods. This is especially true with regard to ceremonial matters. Among some of the present peoples it is customary to replaster and whitewash the walls of the kiva once each year. In the Hopi villages this occurs in February at the Powamu, the festival for the purification and renovation of the earth.[52] If the same practice prevailed in the early periods it may be suggested that the nine layers of plaster on the kiva wall represent that many years. On such a basis it would be evident that the unit was occupied for at least that length of time.

The absence of the sipapu is a condition often found in kivas, particularly many of those belonging to the Chaco culture group. Any explanation for such a lack must be conjectural, but there is a

[52] Fewkes, J. W., 1903, pp. 31–39. Mindeleff, V., 1891, p. 129.

plausible suggestion from modern sources. Mindeleff, during his observations among the Hopi, found traces of two classes of kivas marked by the distinction that only certain ones contained the sipapu. The latter were those in which the more important ceremonies were held. Hence the sipapu at one time possibly differentiated such kivas as were considered strictly consecrated to religious observances from those that were of more general use. The latter probably existed from a very early period and were designed to serve only as club rooms for the men. Certainly many of the more important rites could not be performed in them because of the lack of the symbolical place of emergence. Later, it would seem, the lounging room was done away with and the true kiva served both purposes.[53] Had such been the case in the period represented by the pueblo on the Long H Ranch, it seems rather curious that the first circular chamber provided was of the lounging, club-room type. Perhaps it sufficed until the second unit with its kiva of a truly ceremonial character was built.

After the completion of the first unit a second one was added. (Fig. 14.) This did not occur immediately, but the length of time intervening was probably not great. Beneath the walls of the second unit, which abutted the southwest side of the first house, was a thin layer of sand, ashes, and other refuse of the kind which collects around a dwelling. This might have been a remnant from the pit house occupation. However, some of the potsherds in the stratum were of the pueblo type. This, together with the fact that the foundations of that portion of the original house rested on native soil, indicated that at least part of the accumulation was to be attributed to the occupants of the first unit.

The second unit consisted of seven living rooms, a kiva, and two curious inclosures formed by placing the kiva within a rectangular block. The construction in this section of the building was not as good as that in the original part. The walls were thinner and quite irregular. The rooms were not as well shaped and showed considerable variation in size. The workmanship throughout suggested to a marked degree that a different group had erected them. It is quite possible that the builders of the first house had been joined by others, perchance another clan. The latter may have been living in the vicinity and merely joined forces with the others. Or it may have been that members of the same clan from another location united with those already occupying the site. Such occurrences are not at all uncommon in the recent history of the Pueblos and there is no reason to suppose that the practice did not prevail in the past.

[53] Mindeleff, V., 1891, pp. 130–132.

It is not at all necessary to postulate that the second group came from any great distance. From what is known of the later groups it is more logical to think that they were from the immediate neighborhood. At all events, whatever the cause, the addition was built.

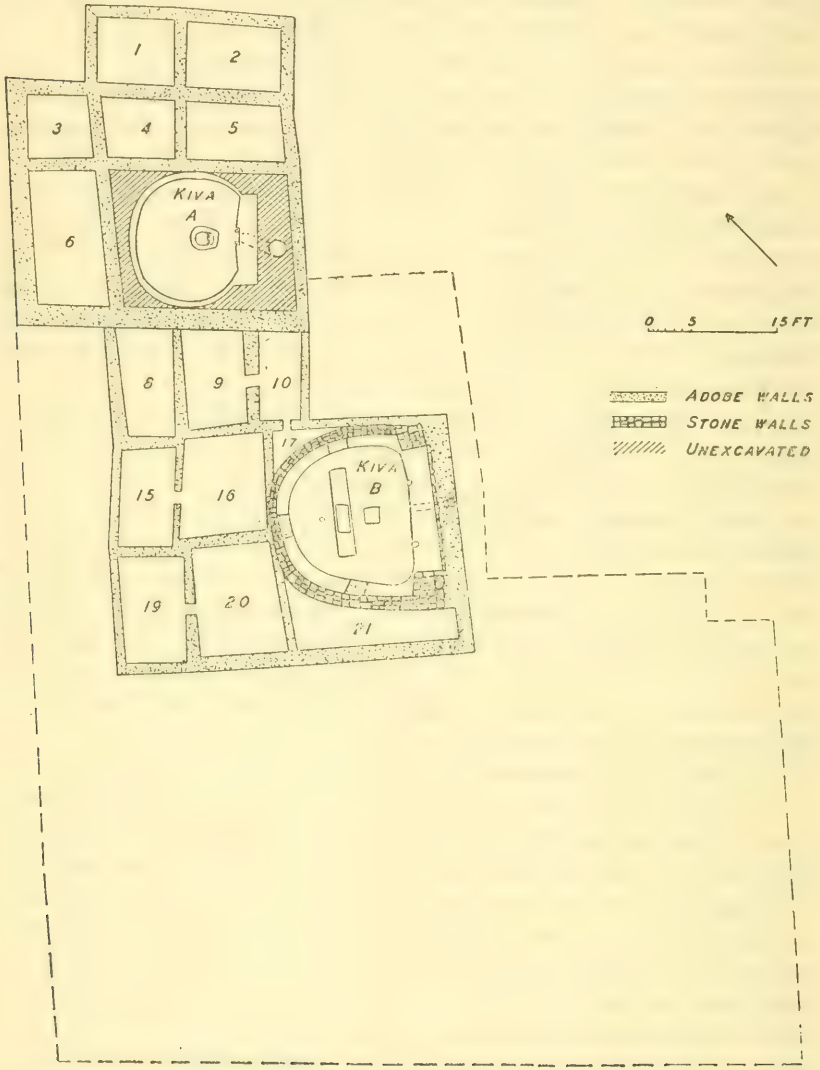


FIGURE 14.—Plan of pueblo with second unit added. Broken lines show extent of completed structure

The only feature of note in the living rooms pertaining to this stage of the building's development was the presence of communicating doorways. There were none in the older part of the house. There were no exterior doorways in the walls and it seems quite

probable that entrance was through an opening in the roof. None of the rooms had fire pits. The group consisting of Nos. 8, 9, 10, 15, and 16 had been abandoned and were partially filled with refuse. This probably took place during a later phase of the life of the community and discussion of it belongs in the consideration of subsequent developments.

The two rooms formed by the kiva and its inclosing rectangular walls (fig. 14, Nos. 17 and 21) are of interest because of the fact that they indicated a usage contrary to common practice. Generally these spaces were filled with earth, as in the first unit. This was presumably done to impart the appearance or suggestion that the chamber was subterranean. Here, however, they were used as compartments, probably storage rooms. The doorway opening into 17 from 10 made access between them a simple matter. In the case of 21, entrance must have been through an opening in the roof.

The kiva in this group (fig. 14, *B*) was different from *A* in many respects. It had an even more pronounced D-shape and a larger recess or platform above the ventilator. The lower part of the chamber, from the top of the bench to the floor, was subterranean. The upper wall was of stone, the first use of that material in a definite masonry construction in the building. The face of the bench was the native earth covered with mud plaster. The stone wall was founded on the surface of the ground. The latter had also served as the top of the bench.

Rising from the bench were three pilasters made from adobe. These had probably served as supports for a cribbed roof. Charred fragments from the timbers used in its construction were found on the floor and they indicated that type of covering. Two large posts had been set in the wall at the ventilator side of the chamber (pl. 7, *b*) and it appeared likely that they had functioned in the same capacity as the pilasters and had supported the portion of the roof over that section of the room. If such was the case, the kiva had had five supporting piers for its covering, three in the form of pilasters and two as distinct pillars. This would suggest that while the main portion of the chamber had been covered with a domelike cribbing, the shelf above the ventilator had a flat roof.

There was a rather shallow rectangular fire pit near the center of the room. It had been dug into the floor and the sides and bottom were covered with plaster. There were no indications of a bordering rim around it. Nothing suggested that a deflector had been placed between the pit and the ventilator. The chamber had a sipapu, so there is no question but what it was thoroughly ceremonial in nature.

Between the sipapu and the fire pit was a feature which was unique. Extending across a greater part of the room was a shallow rectangular depression. Near the central portion of this trench in the floor, between the fire pit and the sipapu, was a rectangular pit. (Figs. 14, 18, kiva B; pl. 8, *a*.) There was nothing to indicate what its purpose may have been. The sides were somewhat darkened by smoke and it contained some charcoal. This unquestionably was to be attributed to the fact that the structure had been destroyed by flames and not to the pit's having been used either as a depository for ashes or as a place in which fires were lighted. It might be that it was the ladder pit. The occurrence of the latter in the position between the fire pit and the ventilator was so consistent, however, that such does not seem plausible. Although it was not in a location similar to that occupied by the rectangular vaults found in the circular kivas near Hawikuh, the Great Kiva at Aztec, or those in the Chaco Canyon, it possibly may have had a somewhat analogous function.[54] Such a suggestion is not very helpful, however. Beyond the fact that the preponderance of evidence shows that the latter were not fire pits nothing is known about them. The feature in B may be one which was more or less characteristic of certain kivas in this region, but there has been so little work in them that the lack of information prevents any conclusions. All that can be done at this time is to call attention to the trench and pit and await the results of further investigations.

The ventilator had been formed by means of the trench and framework method. At its outer end the flue or shaft was of rubble construction, mud and a small percentage of stones. The end of the passage opening into the room was bordered by an offset which probably was for the purpose of holding a closing stone against the aperture. (Pl. 7, *b*.) The broken fragments from a slab of the proper size to have functioned in that capacity were found on the floor. The bottom of the passage had only a slight upward slant to the floor of the shaft.

The next addition to the building introduced some new factors. Six rooms were erected at the southwest side of the second unit. (Fig. 15.) They were built in an L and in conjunction with the side of the second unit formed a court. The walls were for the most part constructed entirely of stone. The only exceptions were those in rooms 38, 39, and 40. The adoption of stone masonry suggests several things. Either the experience gained in the building of the wall of the kiva B had impressed the people with the superiority of that material, they had been influenced by the stone houses in other

[54] Hewett, E. L., 1922, pp. 123, 125–126. Hodge, F. W., 1923, pp. 15, 23–24, 35–37. Judd, N. M., 1922, pp. 115–116. Morris, E. H., 1921, pp. 130–132.

sections, or they were joined by some outsiders who were accustomed to building in that medium. The latter is not meant to imply that a new group or clan joined the village at this time; rather that at most there were only a few individuals. The subsequent story of the

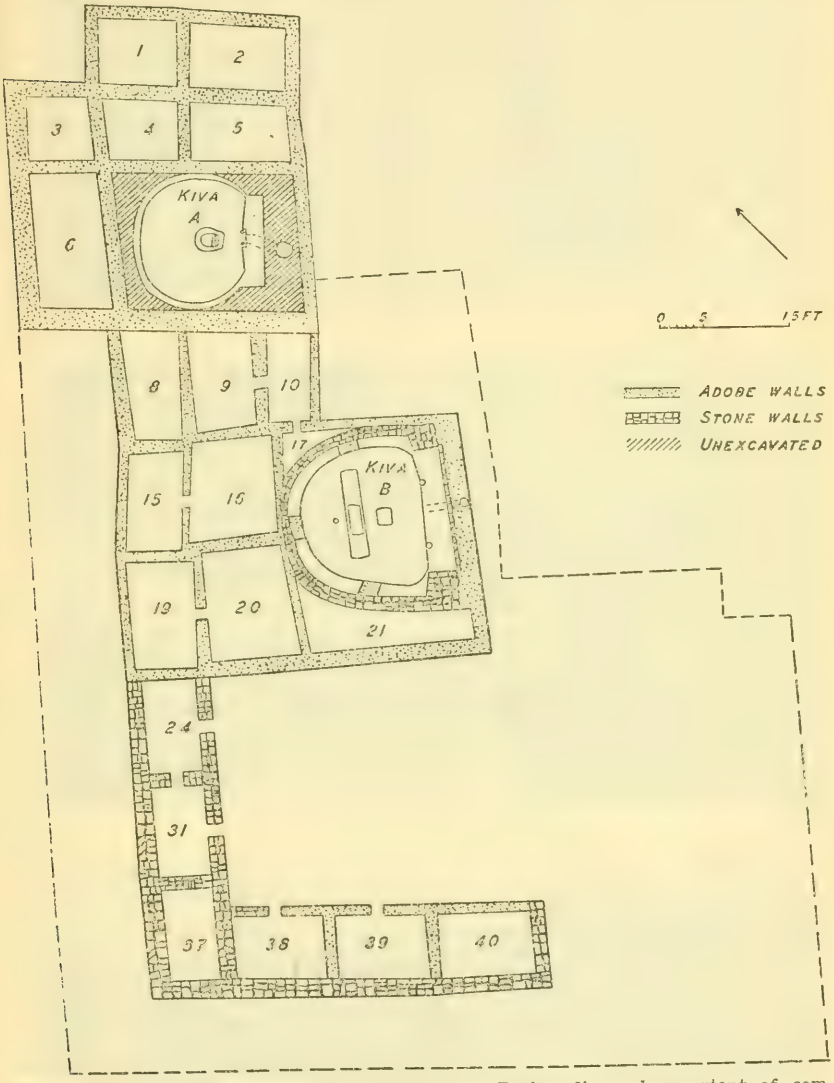


FIGURE 15.—Third stage in growth of pueblo. Broken lines show extent of completed structure

pueblo is not such as to warrant belief that another clan was taken into the community. The probabilities are that the new rooms were erected to replace some of those of the first unit. Whatever the cause for the shift in materials, it must have been one of some con-

sequence because there was no available rock of suitable quality in the immediate vicinity. In fact the stone used in this building probably was carried a good many miles. At the present time the nearest source of supply is some 10 miles (16.093 k.) away.

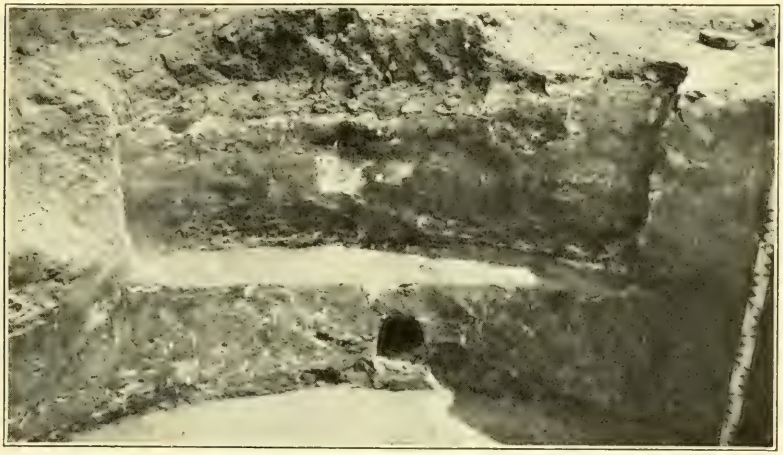
After this new addition had been occupied for a time still further building was done. The latter was not so much a new unit as the completion of one already started. For some reason or other it was decided to build a kiva in the court of the L-shaped wing and to add some more rooms. There were six of the latter, four along the southwest end and two in front of the kiva. (Fig. 16.) The outer surface of the walls at the end of the building was of stone. The inner half was adobe. Hence, for rooms 44 to 47 there was a masonry veneer which gave the outward appearance of a stone wall to one which in reality was largely of mud. The walls of the rooms in front of the kiva were entirely of adobe. The end tier of rooms had connecting doorways and No. 47 had an opening to the exterior, the only one in the building at that stage of its growth.

The method used in constructing the kiva was interesting. A rectangular inclosure was erected in the court and the kiva built inside of it. This left a long, narrow, L-shaped room, No. 32, between the kiva block and the wing of the building which had bordered the court. This room apparently was not used because all of the doorways which had opened into the court were blocked and the space between the walls filled with débris. The same was true for the interval between the rectangular inclosing walls and the kiva.

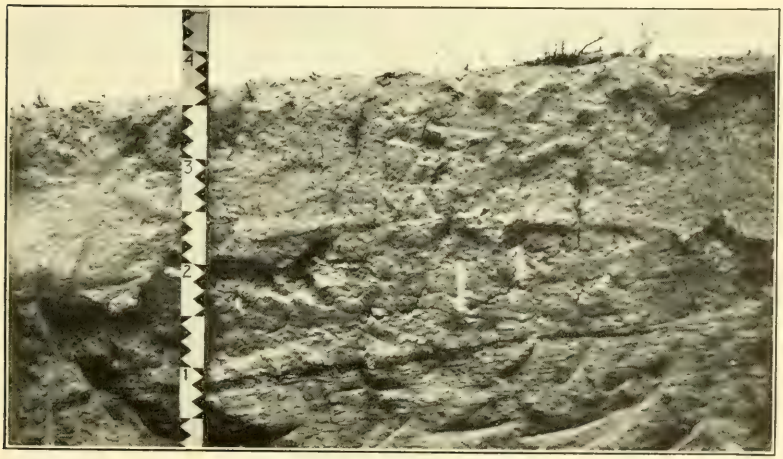
The kiva (fig. 16, *C*) was very simple. The circular form was more closely approximated than in *A* and *B*. The lower portion of the chamber was dug into the ground, although the greater part of the walls had been built up from the existing surface of the earth. There was no encircling bench, but a narrow recess had been made above the ventilator opening. (Pl. 8, *b*.) Pilasters were missing and there was no sipapu. Near the center of the room was a circular fire pit and between it and the ventilator opening a rectangular depression in the floor. The latter was possibly the place where the lower end of a ladder had rested. The two pits were lined with plaster. No bordering rims of adobe were present. An upright slab of stone separated the two. This possibly was a low deflector. There were no indications of any other provision having been made for such a feature. The ventilator was quite small. The horizontal passage had been dug into the earth as a small trench and then covered over. The shaft at the outer end was built in the wall.

Although it could not be definitely determined that such was the case, it would seem that the abandonment of the first unit took

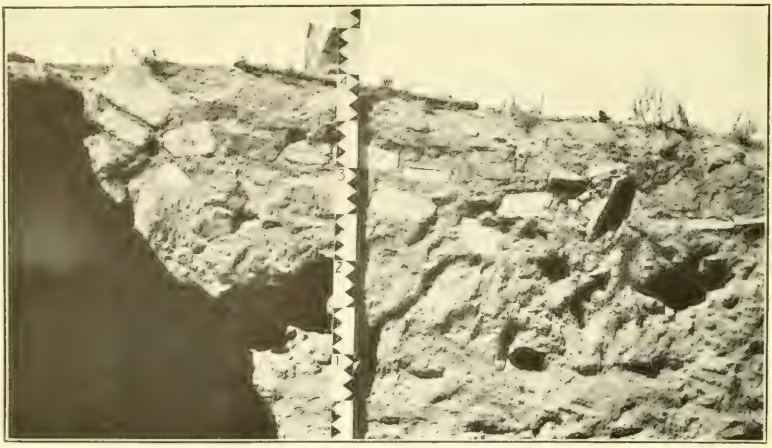
a. Fire pit and trench in floor of kiva B



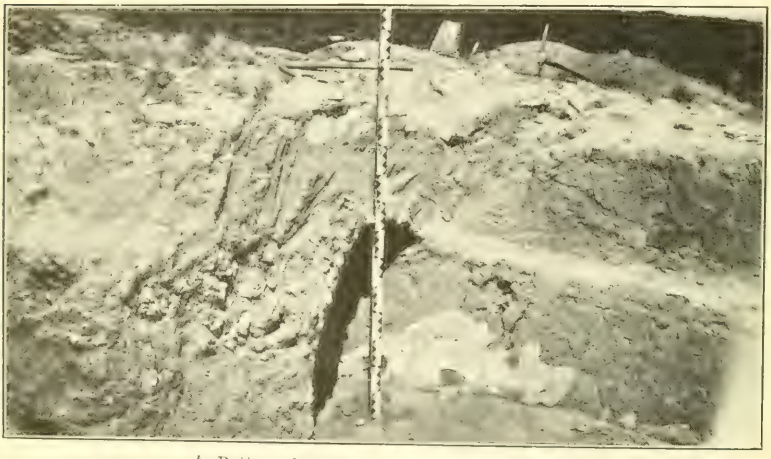
b. Ventilator recess in kiva C



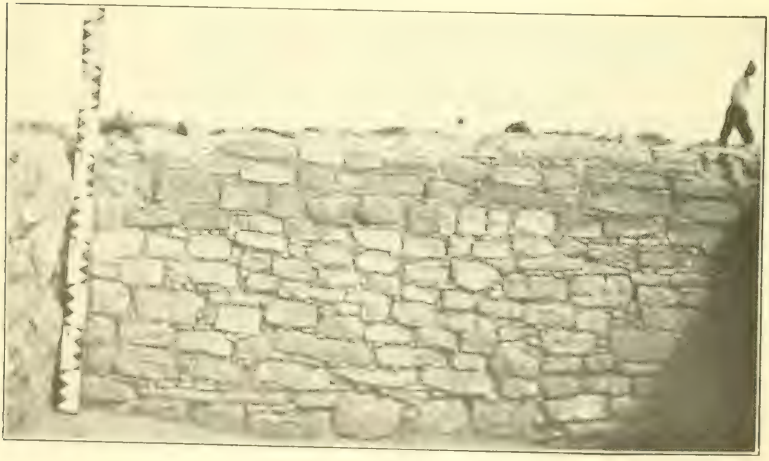
c. Wall built on débris of accumulation



a. Foundations on débris in room 6



b. Bottom of stone wall resting on fill in kiva A



c. Example of masonry construction

WALLS IN PUEBLO RUIN

place at about this time. Some of the rooms had probably been vacated when the L-shaped wing was completed. Then after the kiva was built in the court it took the place of A and the entire original building fell into disuse. Kiva C with its simplicity and

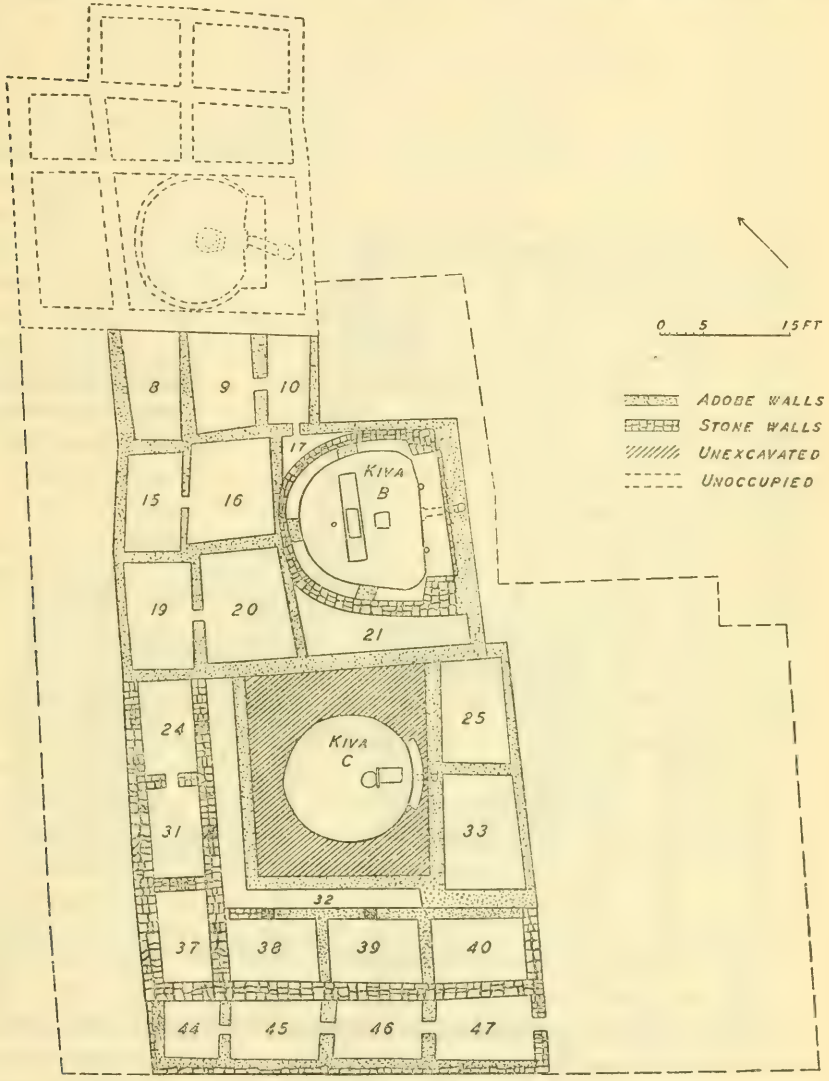


FIGURE 16.—Fourth stage of pueblo structure. Dotted lines indicate unoccupied first unit

lack of interior features, such as pilasters, sipapu, etc., was very suggestive of A. It may well have been for similar purposes and was intended to replace the original circular chamber. That the first unit was abandoned during this interval was probable because

it had become entirely filled with rubbish, windblown sand, and other débris before the final additions were made to the building. Some of the rooms in the old part of the pueblo, 3, 6, and the kiva

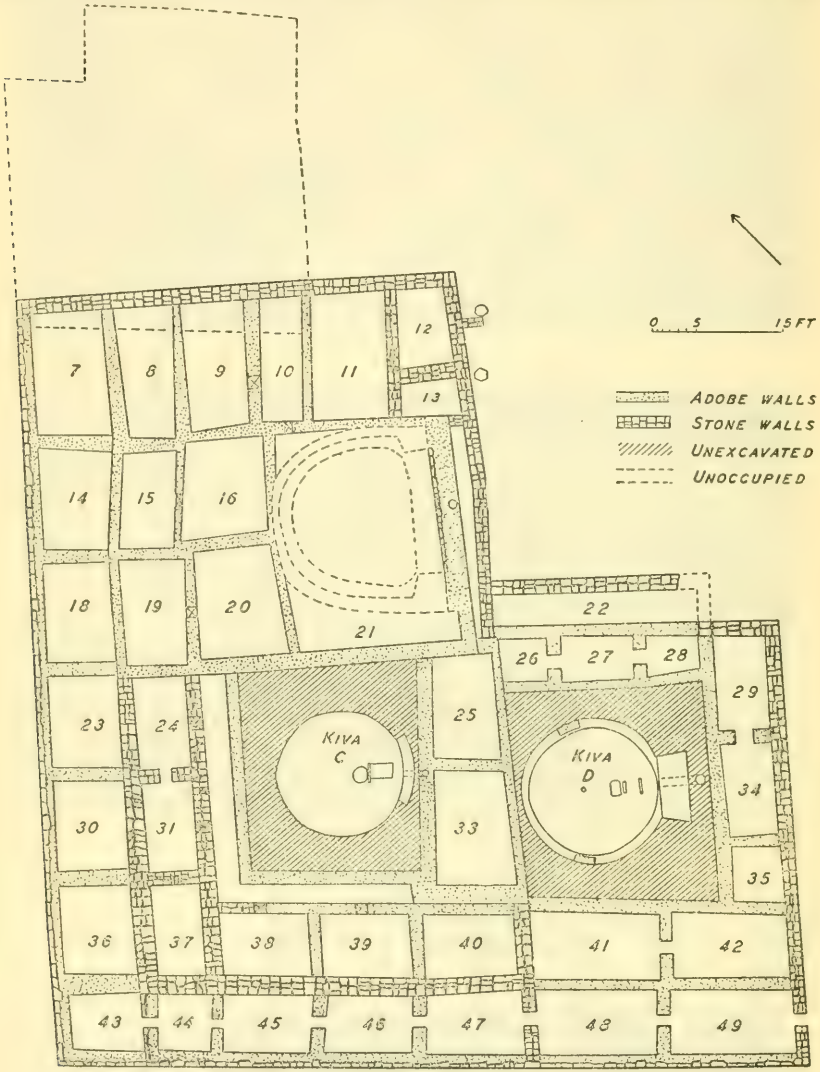


FIGURE 17.—Final stage in the pueblo building. First unit entirely abandoned and Kiva B filled in and covered by a court

particularly, had been used as a dumping place for refuse. This was more marked in room 6 than in the others.

The final outburst of building activity materially increased the extent of the pueblo and somewhat changed its form. (Fig. 17.) The remodeling augmented the structure by 21 rooms and a kiva.

This development probably was stimulated by the fact that kiva B and some of the surrounding chambers had been destroyed by fire and it was necessary to erect new ones to replace them. That the conflagration was late in the occupancy of the group was shown by several things. Mention was made of the fact that rooms 8, 9, 10, 15, and 16 had been used as dumps. All indications were that they had functioned in this capacity after the completion of the third unit. (Fig. 16.) Possibly some of those who had lived in them moved into a newer section of the building. After considerable refuse, ashes, broken pottery, bones, and house sweepings had been deposited in these rooms the kiva burned and fire damaged the roofs of adjacent chambers. This was clearly demonstrated through the finding of a layer of charcoal and burned roofing plaster on top of the refuse in the rooms. Furthermore, room 25 contained considerable débris which could be directly attributed to the fire. This is good evidence that the room had been erected previous to and probably had suffered as a result of the kiva conflagration. Kiva B was never reoccupied. The remains of the burned roof were lying on the floor and the fill above consisted of typical débris of accumulation.

That the fire preceded the erection of the kiva D unit was shown by the fact that the only traces of the catastrophe were underneath the foundations of the walls and below the floors of rooms 22 and 26 and underlay the long wall extending to the northeast corner of the building. The row of rooms at the northwest side of the structure was built on a considerable stratum of débris of accumulation (pl. 8, *c*), the upper part of which contained many charred bits of wood and burned plaster. The foundations of the final outer wall in that portion of the building were from 1 to 2 feet (30.48 to 60.96 cm.) above those of the corresponding parts of units 2 and 3. This is good evidence that an appreciable interval elapsed between the completion of the third group and the erection of the last series of rooms.

In addition to the actual new construction certain alterations were made in some of the older rooms. A doorway was cut in the wall of room 44 so that it connected with 43. That this was not an original feature in 44 was evidenced by the difference between the plaster in the wall and that used in the doorway. The openings connecting rooms 19 and 20, 15 and 16, and 10 with 9 and 17 were blocked. At the latter end of the building still further changes were made. The northeast outside wall was built over the remains of a part of the first and original unit. The foundations rested on the fill in room 6 and kiva A. (Pl. 9, *a*, *b*.) The walls of rooms 8, 9, and 10 were extended to meet the newer end of the building and floors were laid over the refuse in them. This raised their

levels considerably and it probably was necessary to elevate the walls and roofs to compensate for the difference. Rooms 15, 16, 19, and 20 had also been provided with new floors to correspond to the newer levels. In order to accomplish this, their lower portions were intentionally filled. The relation of the new to the old floors is illustrated in the section drawings of Figure 18.

The additions to the height of the walls which the new floors would have required probably produced a terraced effect in that section of the building. There was probably a small court in front of these higher chambers. Beneath its surface of occupation lay the remains of kiva B. The stone wall which was erected in front of the abandoned ceremonial chamber was probably built mainly to hide the damaged portion of the building and to carry out the illusion of a masonry structure. The space between it and the kiva wall was filled with rubbish and the débris in the chamber proper reached to the tops of the walls, a surface for the floor of the court.

The final additions had been constructed of stone, adobe, or a combination of the two. The outside walls along the northeast and southeast sides were entirely of stone, while the northwest and southwest ones were of the veneer type. With the exceptions of rooms 12 and 13, all of the interior partitions were of adobe. The supply of rock was probably too limited or else the builders tired of the job before they had transported an amount sufficient to permit its use throughout. Hence they made what was on hand go as far as possible by placing it only on the exterior surfaces. To all outward appearances the pueblo was a stone structure. This suggests that even in a so-called primitive group of many centuries ago people were concerned with the idea of impressing their neighbors or of keeping up with shifting styles in dwellings, even though they were only doing it in a very superficial way.

This gesture of an outside wall of stone seems rather absurd when it is recalled that the whole exterior of the structure was probably covered with plaster. Of course it might have been that such walls were built out of consideration of the better wearing qualities of rock, but this seems doubtful. As a matter of fact it is questionable whether the veneer wall would be as serviceable as adobe alone. That the builders were capable of erecting good masonry was evident where stone was used. (Pl. 9, *c*.) Such walls were composed of large blocks, partially worked and smoothed on their faces and chinked with smaller stones. Potsherds were occasionally used in the latter capacity, a practice quite common in houses of the Chaco cultures.

The row of rooms, 43 to 49, with communicating doorways was interesting. (Pl. 10, *a*.) Series of doorways are frequently found

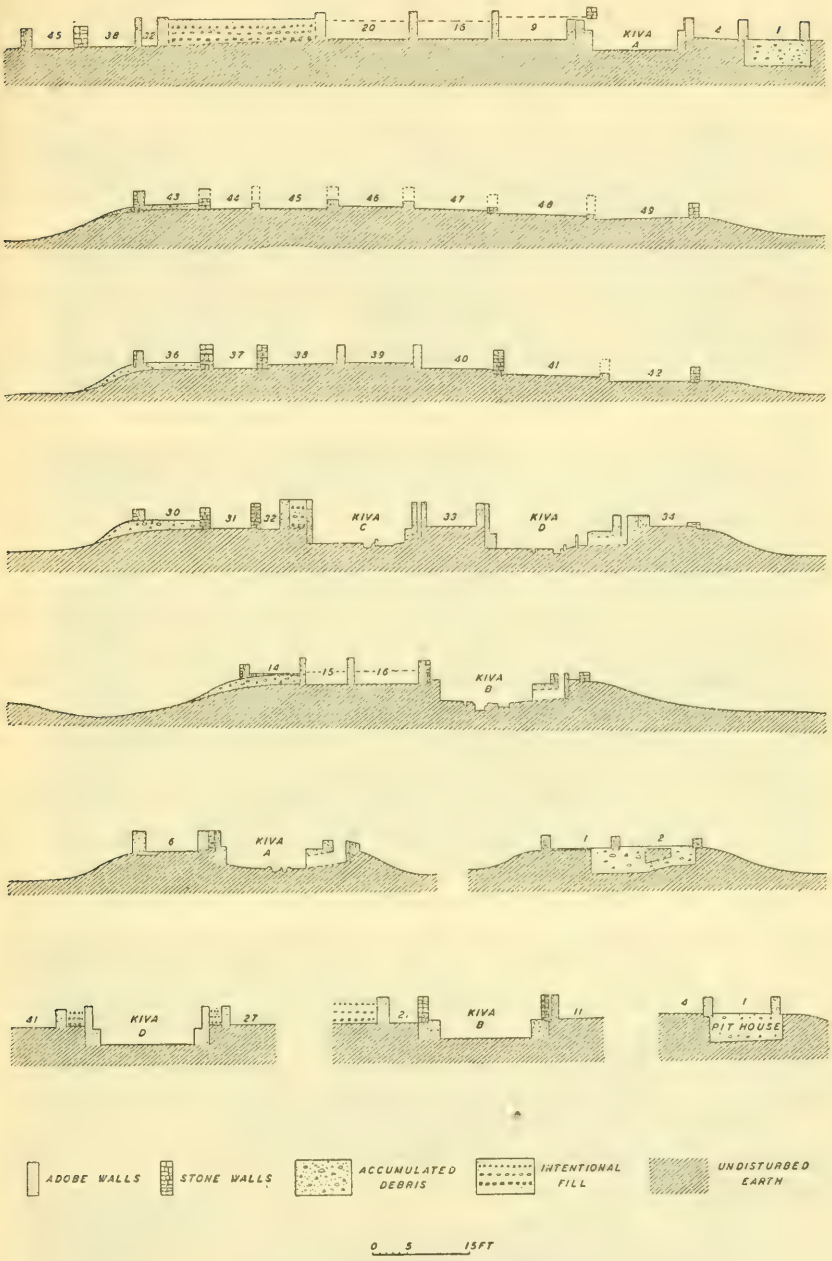


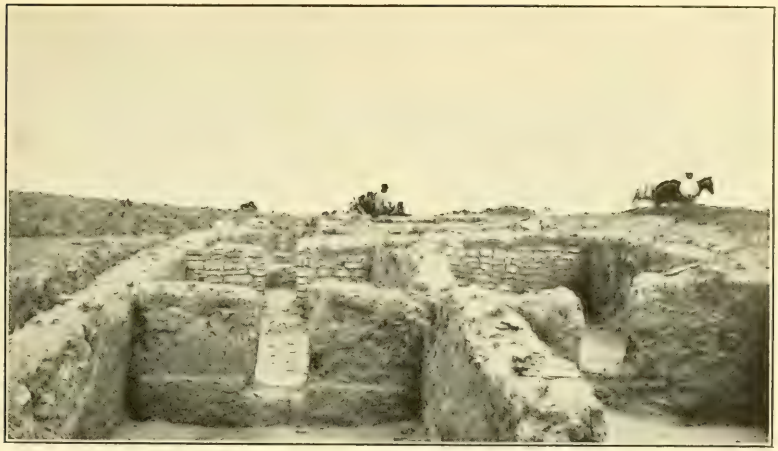
FIGURE 18.—Sections through various portions of the pueblo ruin

in ruins of the Chaco type. It is not at all unusual to find groups of four, but seven in a row is a bit exceptional. Probably the largest number ever found in one tier of rooms is in Pueblo Bonito in the Chaco Canyon where there had been 12, possibly 15. The only exterior doorway in the pueblo in its completed state was that at the south corner of the building. Entrance from the outside to all other chambers must have been through the roof. Beyond the feature of doorways there was nothing of any special interest in the various rooms.

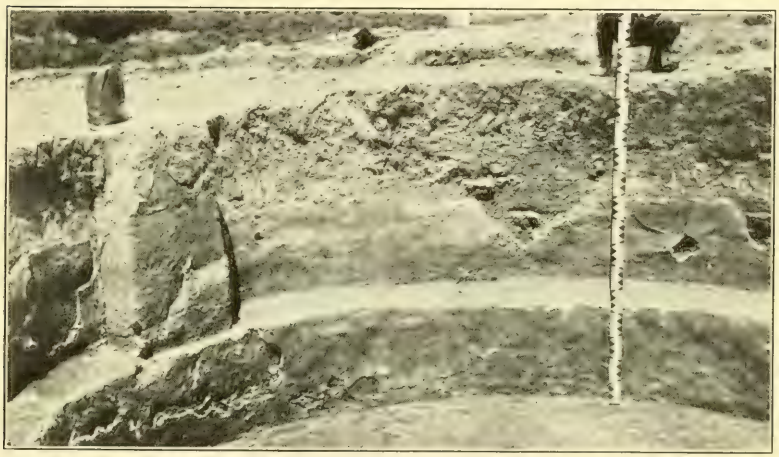
Kiva D unquestionably belonged to the last occupied section of the building and probably was in use up to the time that the pueblo was abandoned. This was shown by the fact that the chamber was filled with fine blow sand which contained no ashes or potsherds. Had people been living in other parts of the structure traces of their presence could scarcely have escaped being present in the fill. The chamber had simply been vacated along with the rest of the building and sand gradually accumulated in its interior. Eventually the timbers decayed and the entire roof fell in. There were no indications of fire in the débris, so that the collapse must have been due entirely to the action of the natural forces of decay.

Kiva D was more carefully built and better finished than the other three ceremonial rooms. It was fairly circular in form, had an encircling bench, two pilasters, a sipapu, fire pit, deflector, ventilator, and ventilator recess. (Pl. 10, *b*, *c*.) Approximately half of the room had been subterranean. The bench had been dug, not built up, and its top was somewhat below the old ground level. The upper wall was founded on what had been the surface at the time when the building operations were under way. This wall was largely of adobe, but it did have some stone in it. The latter was sparingly used, although it occurred in greater proportion than in the walls of the ordinary rooms. Here, as in kivas A and C, the triangular inclosures formed by the circular and rectangular walls were filled in with earth. This was determined, as in the case of the others, by partial excavation. As soon as it was discovered that the fill was intentional, not débris of accumulation, work was stopped. Nothing was to be gained by completely clearing them.

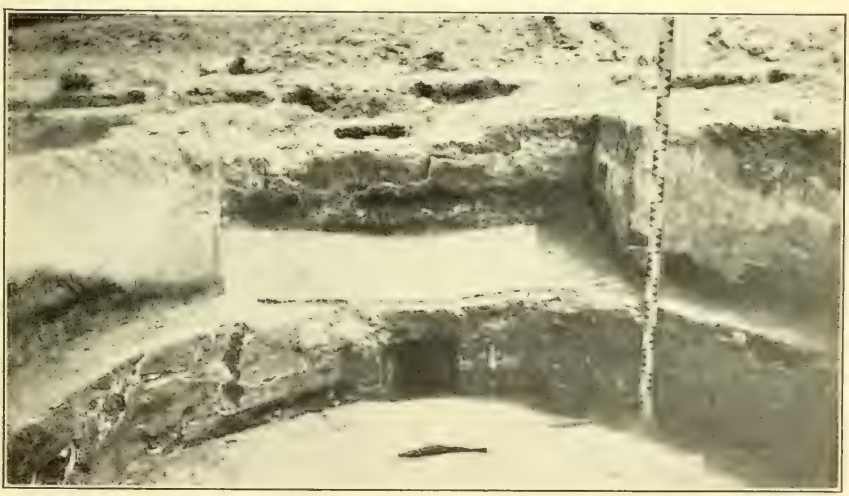
The fire pit in this kiva was rectangular with rounded corners. There was no ladder pit, but between the edge of the pit and the deflector a low, thick stone had been set in the floor. This probably was to prevent the ladder from slipping into the pit or damaging its side. The deflector stone was broken, but its fragments showed that it had risen 1 foot 6 inches (45.72 cm.) above the floor. The stone had been set in the floor midway between the fire pit and the ventilator opening. The sipapu was placed in approximately the



a. Row of rooms with connecting doorways



b. Bench and one of pilasters in kiva D



c. Ventilator and recess, kiva D

CULINARY VESSELS FROM THE PIT HOUSES

center of the room. There was no distinguishable difference between it and those described for the pit houses.

The ventilator passage had been dug as a trench and then covered over. As in the other kivas, the shaft was built in the wall. At the chamber end of the passage the opening had a small offset like those in the other ventilators. The recess above the passage was more pronounced in this chamber than in the others. It was not as broad but much deeper. In all respects it was more like those in the kivas which are frequently referred to as typical San Juan ceremonial chambers. This feature is especially prominent in the unit-type ruins first made known by Prudden;[55] is found in some of the Cliff Palace and Spruce Tree House kivas on the Mesa Verde in southwestern Colorado;[56] occurs in the Aztec Ruin in northwestern New Mexico;[57] is present in the Chaco Canyon; and has been reported from northeastern Arizona.[58]

The question of what the function of such recesses may have been is still a problem. It has been suggested that they may be analogous to or possibly represent the prototype of the so-called spectators' bench or platform in the Hopi kivas.[59] If such was true, members of the group not actually participating in the rites taking place in the main part of the chamber possibly retired to the recess. From this vantage point they could observe and yet not intrude on the ceremony. Along the front edge of the niche, above the ventilator, a pole had been embedded in the plaster, ostensibly to reinforce it. This suggests that sufficient use was made of the platform to warrant provision against damage to the surface due to people stepping up or down or sitting along its edge. The mold left by this pole is plainly visible in the picture of the kiva. (Pl. 10, *c*.)

On many sections of the walls and bench the plaster was in a good state of preservation. Here, as in kiva A, it was possible to count a number of layers. The plaster showed distinctly 10 separate coats. On the basis of one layer to a year, as previously discussed, this chamber presumably was occupied for at least 10 years. It was quite apparent that each coat of plaster had been whitewashed after it was applied and then had become darkened by smoke and the general wear and tear resulting from day-to-day happenings transpiring within it.

There were two exterior fire pits associated with the final period of the building. These were located at the northeast corner, outside

[55] Prudden, T. M., 1914, fig. 4, p. 45.
[56] Fewkes, J. W., 1909, pl. 1; 1911 b, pl. 8.
[57] Morris, E. H., 1924, map of the ruin.
[58] Kidder, A. V., 1924, fig. 12, p. 69.
[59] Fewkes, J. W., 1911 a, p. 24.

of rooms 12 and 13. Both pits were lined with stone slabs. A small, low wall had been built out from the side of the pueblo near one of them. This possibly was to serve as a windbreak or even perhaps was intended as a sort of bench or table. There were no other fire pits around the building. It is quite possible that there had been some for earlier stages, but that they had been covered over during subsequent building operations. Certainly there must have been some provision for fires, as none of the rooms had pits.

There was nothing in the ruins to indicate that at any time during the occupation of the various units the structure had been more than one story in height. As previously stated, it may have been terraced to a certain extent in the final stage as a result of erecting rooms over the remains of the original unit. The natural slope of the ground on which the pueblo was built may also have contributed to such a condition. The floors of the rear row of rooms were considerably higher than those at the front or southeast side and there may have been a corresponding difference in the walls and roofs. The variations in floor levels and room relationships throughout the structure are shown in the sections illustrated in Figure 18.

Considering the building as a whole, there are many features about it which are more reminiscent of some of the compact structures of the San Juan region[60] than of the pueblos of the Little Colorado area in which it is located. The latter are in large degree rectangular, oval, circular, or polygonal blocks of rooms built around a central court.[61] There is some suggestion of a resemblance to certain small structures in the upper Gila region to the south but this is not as pronounced as that of the northern indications.[62] The kivas, D especially, strongly suggest a San Juan influence. The difficulty in the whole problem lies in the fact that too little is known about the eastern portion of the Little Colorado area. This pueblo unquestionably represents an earlier period than the bulk of those referred to in various reports on the region. It may well be that it is typical of an older stratum, one which up to the present time has not been definitely recognized and which has more in common with northern groups. Kiva patterns and their characteristics are practically unknown for this region. Future work may show that the forms in the building on the Long H Ranch are normal or again that they unquestionably are to be attributed to a northern intrusion.

The main refuse mound for the pueblo was located to the east of the structure. There was a much smaller one a short distance to

[60] Roberts, 1925, fig. 7.

[61] Bandelier, A., 1892 b, pl. 1. Mindeleff, V., 1891, plates and figures throughout. Spier, L., 1917, figs. 3, 4, 5; p. 325.

[62] Hough, W., 1907.

the southwest. The latter appeared to be rather late in its deposition, possibly toward the very end of the occupation of the dwelling. Such a conclusion is based on potsherd evidence. The fragments here had a higher percentage of later forms than was observed in the larger one. The latter was the one which had rested upon the filled-in remains of some of the pit houses of Group 4. It contained 10 burials. There were no interments in the small mound. So small a number of graves for a pueblo of this size seems rather strange. All indications were that the building was occupied for a fairly long period of time and that the group which inhabited it was fairly large. Under such conditions it would normally be expected that there would be a relatively large series of burials. It may be that additional interments were made at some other place in the neighborhood of the village and did not come to light during the investigations.

House Type Summary and Conclusions

The ruins in the vicinity of the Twin Lakes on the old Long H Ranch in eastern Arizona, the Kiatuthlanna of the Zuñi, were found to consist of pit dwellings, jacal houses, adobe structures, and a true pueblo of both stone and adobe construction. All of the evidence suggested that the various forms of domicile developed in the order named. Certain of the pit houses were unquestionably the oldest, and the pueblo was clearly subsequent to the other dwellings.

The pit houses were of two types. One consisted of a small, roughly circular or oval, rarely rectangular, pit whose walls were more or less vertical from the floor to the ground level. The other was much larger, circular or oval in contour, and the upper part of the walls was augmented by an encircling bench. The smaller examples probably represent the early form and the larger the ultimate development. The small houses have much in common with some of the structures belonging to the end of the Basket Maker III period. At the present time the nearest counterparts of the large ones which have been uncovered are in the Chaco Canyon and southwestern Colorado.[63] Both differ in some respects from the Long H Ranch forms, but are comparable to them. Various examples of the subterranean house have been found in the Southwest, but, with the exception of those just cited, they bear only the most superficial resemblance to the present forms. Those which Hough excavated near Luna, N. Mex., are totally different.[64] Bradfield's structures in the Mimbres region of southern New Mexico are still another type,

[63] Judd, N. M., 1924, pp. 403–406. Martin, P. S., 1930, pp. 27–33.
[64] Hough, W., 1920.

as also are those which Cummings and Haury uncovered at Tanque Verde, 25 miles (40.234 k.) east of Tucson, Ariz.

The superstructure erected over the pit in both types of dwellings was supported by four upright posts set in the floor. They were generally, but not always, placed at approximately the directions of the four cardinal points of the compass. These main posts carried a series of four stringers which supported smaller poles that formed the flat ceiling and sloping side walls. The slanting poles in the small houses extended from the ground to the rectangular framework on the upright posts, but in the larger ones their butts rested in the angle formed by the top of the bench and the rear wall of the excavation. In the center of the flat portion of the roof was an opening which served both as a smoke hole and an entrance. The wooden framework was covered with leaves, brush, bark, reeds, and earth. The upper surface of the latter was generally plastered to increase its ability to shed water. Where reeds were used in the covering they apparently were just piled on. No trace of reed mats such as were used on the roofs of similar structures in the northeastern part of Arizona were observed at the Long H site.

There were certain features found in both forms of the pit dwellings which may be considered as characteristic of the houses in general. At the southeast side was a ventilator, consisting of a horizontal passage and a vertical shaft. This undoubtedly was a survival in modified form of the entrance used in Basket Maker III houses. Near the center of the chamber was a fire pit which usually was accompanied by a secondary depression in which the ladder used in gaining entrance rested. In most of the houses there was a small hole in the floor between the fire pit and the wall opposite from the ventilator. This is supposed to be analogous to the sipapu, the symbol of the mythical place of emergence, found in the later-day ceremonial rooms. Frequently there was an upright stone slab set in the floor between the fire pit and the ventilator opening. This is known as the deflector. The purpose was to prevent air coming in through the opening from blowing directly on the fire. The complex of ventilator, deflector, ladder and fire pits, and sipapu may be considered as characteristic of the houses. One or two of the features occasionally may not be present, but a majority of them consistently are. The interesting fact about this complex is that it survived long after the pit dwelling had passed out of existence and is to be observed in the ceremonial chambers of later-day pueblo structures.

The pit houses were found to occur in groups of from four to six. This was considered to be an indication that separate family or clan groups formed each cluster, several of which might constitute a

village. In three of the groups the more central structure was somewhat larger and suggested that it may have had a ceremonial significance not attached to the others. Possibly this was a prototype of the kiva of later periods.

The information on the jacal and adobe structures was found to be very meager. Beyond the fact that the former had walls of poles covered with mud and had ranged from single to several-roomed dwellings little could be learned. There was just enough evidence to indicate that they may have been similar to the jacal houses of a certain phase of the Pueblo I period in southwestern Colorado. The lesser objects found in association with the jacal remains showed that they were contemporaneous with the large pit dwellings. There was an overlapping of forms which may be attributed to a longer continuance of the pit type of house in this region. The remains of a single-roomed adobe dwelling indicated a similarity to the jacal houses, except for the fact that no poles had been used in the walls. Superposition showed that this structure was later than the small type pit house, but potsherds indicated that it was at least in late contemporaneity with the large pit dwellings and the jacal domiciles.

The pueblo structure was found to have been a building consisting of adobe, stone, and veneered walls. Abutting rooms and differences in foundation levels demonstrated that it had not been erected as a complete dwelling, but had grown by degrees from a single small unit. The original house was a group of six rooms and a kiva or ceremonial chamber. The general character of this beginning stage in the development of the large building was quite suggestive of the unit-type dwellings of Pueblo II. It was more advanced than the latter, however, as the ceremonial chamber was incorporated in the block of the house instead of being sunk beneath the court in front of the living rooms. In this respect it was comparable to some of the small-house ruins in the Chaco district. It is quite possible that it may have been built at about the end of the Pueblo II period, although it probably dates from early III.

After the original dwelling had been occupied for a time a second unit consisting of seven secular rooms, two storage chambers, and a kiva was added. This addition was at the southwest side of the original unit. The choice of location was probably governed more by natural conditions than special choice. At the northwest side of the first group of rooms the ground had a marked slope with a drop of some 10 feet (3.048 m.). The same situation prevailed on the other two sides. Hence the spot where the new rooms were erected was the only practical one on which to build. The construction in the second unit was inferior to that in the first. This sug-

gested that it might possibly have been built by a different group of people, perhaps a new clan which had joined forces with the older settlers. Furthermore, the first use of true masonry appeared in the upper walls of the kiva.

The third stage in the growth of the structure was marked by the erection of an L-shaped wing of six rooms at the southwest side of the second unit. This series of chambers formed a court in that portion of the building. Indications were that these rooms were probably intended to replace some of those in the old part of the structure, the latter for some reason, possibly the need of extensive repairs, being no longer held satisfactory. The outstanding feature in the new part of the building was the use of stone in the wall construction and exterior doorways opening into the court.

The next development consisted of the erection of another group of six rooms and a kiva. Four of the rooms were situated at the southwest side of the L-shaped wing and the kiva was placed in the court formed by the latter. The other two rooms were built in front of the ceremonial chamber. The use of the court as the site for the new kiva was accompanied by the blocking of all the doorways which had opened into it. The use of stone in this addition was limited to a facing or veneer on the outer surfaces of the walls at the southwest end of the structure. The completion of this unit apparently marked the end of the occupation of the original house and it was permitted to fall into ruin. Some of the rooms in the second unit were also vacated at this time and then were used as dumping places for refuse.

The pueblo was occupied for a considerable interval in the form which it had attained at the end of the fourth stage of building activity. Then, from some cause or other, the kiva of the second unit was swept by fire and a number of surrounding rooms were damaged by the flames. The inception of the final period of constructional work was probably a result of this conflagration. At the conclusion of the operations 21 rooms and a kiva had been added to the building and a number of the older chambers had been remodeled. The use of stone was restricted to the outside walls. As a matter of fact on two sides of the building the rock surface was only a veneer. Outwardly the pueblo appeared a structure of stone, while inside the walls were mainly of adobe. The dwelling as a whole was more like those of the San Juan area than the Little Colorado ruins. This may be found to be characteristic of the region, however, when more ruins of the type have been excavated. At present practically nothing is known of the small pueblos in the Little Colorado area, consequently it is not possible to draw definite conclusions.

Among the interesting things to be observed in the pueblo, the most outstanding is that from the period of the addition of the second unit to the end of the occupation of the building there were only two ceremonial rooms in use at one time. When a new one was built it replaced an older one, which was then abandoned. Furthermore, the kivas were of two types. One had no pilasters, no sipapu; the other had both. If, as suggested in the discussion of kiva A, the chamber without a sipapu was merely a lounging place for the men, while the other was the religious center, the whole pueblo probably represents the growth of a single homogeneous group. On the other hand, it may be that the kiva differences were due to the fact that there were two associated divisions and the form of the ceremonial room was correlated to the group. The actual conditions in the growth of the building would tend to suggest that the latter was the case.

Judging from the evidence at hand there is a hiatus between the pueblo form of structure and the jacal and pit dwellings. The change from one to the other was too abrupt to warrant the belief that the people involved ceased building one form and adopted the other. Such a thing might be possible if the newer form was introduced as an already developed house type, but even then the shift would probably be marked by abnormal conditions. Conquest by another group with a distinct culture of its own could produce such a result. Yet an almost complete destruction of the older group would be essential if nothing of their culture was to remain. There is as sharp a break in the lesser objects made by the two groups as there is in the types of the houses. This would indicate that the jacal-pit house peoples abandoned the site and that it was reoccupied later by a more highly developed house-building group. What caused the gap between the cultures is not known. The intervening stage, the transition leading from one to the other, may have taken place in the vicinity, but certainly did not occur at the Twin Lakes, unless evidence of it was completely missed. The situation may briefly be summed up in the statement that there are pit-house and jacal remains of the Pueblo I period and pueblo ruins of the early part of Period III, but no intervening II.

MINOR OBJECTS OF MATERIAL CULTURE

In the consideration of specimens obtained from an archeological excavation there is one factor which frequently is overlooked, namely, that the average collection does not truly portray the arts and industries of the people. The picture is generally one-sided and it is easy to fall into the habit of thinking only in terms of pottery, stone and bone implements. These articles represent but one phase,

that of the objects made from imperishable materials. Against them should be balanced a large number of things which by their nature could have but a transitory existence. Articles of clothing, sandals, baskets, wooden implements, and all articles fashioned out of perishable substances rapidly decay and crumble into dust unless conditions are particularly favorable for their preservation. The nature of objects in this group has been determined for many of the cultural stages in the Southwest as a result of finds made in cave sites. There a protecting cover of dry sand and the virtual absence of all moisture kept them intact for many centuries. Only in rare instances are such specimens recovered from a ruin located in the open. Their apparent lack, however, should not be construed to imply that they did not exist. It should be borne in mind that even though no traces remain, the people undoubtedly manufactured them and they played a prominent rôle in the day-to-day life of the group.

Practically all that was recovered from the Long H Ranch ruins were the objects of an indestructible quality. A few charred fragments of basketry constitute the only examples of the products subject to decay. Hence, in the following pages but half the story is told; the rest must, unfortunately, remain unknown. In order to facilitate discussion and to make clear the period differences the several classes of objects from the pit houses and the pueblo will, as far as possible, be discussed together. For example, under the heading of pottery all of the ceramic specimens from the site will be described, the outstanding characteristics of the separate horizons being stressed. The same procedure will continue throughout.

Pottery

Pottery first appeared in southwestern cultures during the Basket Maker III period. Unfired clay containers were probably made in the closing days of Basket Maker II, but it was not until the following stage that true ceramics were developed. From then on they had a steady growth and became the outstanding industry of the people. There is some question as to whether pottery in the Southwest represents an independent invention or an introduction from the Mexican area to the south. If it was not indigenous in the region, at most it was only the idea which was borrowed. There is considerable evidence to show that the whole development was unquestionably local.

The mud-pottery vessels, the early unfired group, appear to have been made by a combination of methods. The bottoms were molded in baskets, while the sides were built up by means of strips or fillets of clay. The latter were looped around the upper edges, each mak-

ing a single circuit of the perimeter and being pressed or welded to the one below. The expansion or contraction of the walls of the vessel, where a constricted orifice was desired, was controlled by the length of the clay fillets. This procedure was followed until the end of the Pueblo I period, when a new method was developed. In the latter longer fillets were used. They were carried around the sides of the vessel several times before being fastened at the end. This was the inception of coiling, the full attainment of which was reached just prior to the great urban stage of Pueblo III. It has continued down to the present. By this method the entire vessel is made from a long spiral of clay, beginning at the center of the bottom and working out and up until the vessel is completed. Each short strip is attached to the end of the preceding one, as needed during the growth of the container, thus forming one long continuous strand of clay. The difference in the technique of manufacture is important. It marks the boundary between characteristic vessels of Pueblo I and later periods. The short-looped wares belong to the early periods, while the coiled fall in following horizons.

Over a greater part of the Southwest there is plenty of material from which to make pottery vessels. Suitable clay is to be found at no great distance from most of the settlements, but this alone will not suffice. A binder or temper of some sort is necessary to prevent cracking in the process of drying and firing. On the other hand it is just as important not to use too much tempering, because under such conditions the clay would lose its cohesiveness and the vessel tend to crack or collapse. The mixture of clay and tempering material constitutes what is called the paste of the vessel. It is the substance from which the bowls and jars and other forms are fashioned.

The binder in the mud wares of later Basket Maker II times was cedar bast. With the discovery that a better container would result if the object was baked in a fire it became necessary to use some noncombustible material in that capacity because the vegetal material burned out, leaving holes in the vessel. Hence the cedar bast was replaced by sand and the true pottery of Basket Maker III is characterized by this form of temper. The older the vessels in the ceramic sequence, the greater the amount of sand in their composition. The later forms show a marked reduction in its percentage. The potters were learning, through experience, that a small amount of tempering and a better kneading of the clay made for a harder, more compact texture. During the progress of pottery making in the Pueblo I period sand was gradually replaced by ground or powdered rock. The nature of the latter varied from district to district. In some sections it was a light-colored, quartzlike substance,

while in others it was of a dark igneous character. Both forms are present in other regions. The potters of the Pueblo II period shifted from powdered rock to ground potsherds and that became the common tempering material. Even at the present time most of the Pueblo women use this for binder in their clay. Wherever possible they obtain fragments from the older ruins in order to make the tempering material.

The surfaces of the vessels received particular attention. In the late Basket Maker period, Basket Maker III, all signs of the loops or bands of clay were obliterated as far as possible. This was done by rubbing the pot while the clay was still moist. Various objects could have been used for this purpose. For example, a piece of gourd, a stick, a corncob, a fragment from a broken bowl or jar, or a stone. Although the surfaces were smoothed during this period they did not receive the careful polishing noted in later stages. The true polishing stone for pottery thus far has not been found earlier than the Pueblo I horizon, and it is only sporadic in its occurrence in that level. It does not become prevalent in ruins until Pueblo II and later.

During Pueblo I it became the custom to leave the bands around the exterior of the necks of the large jars, although the bottoms continued to be smoothed. These form the group called the banded-neck pots and are quite typical of the period. All other forms were rubbed down both inside and out. In addition, however, the surface was treated with a wash of "liquid clay," practically a saturated solution of water and earth, called the slip. This was a new development which continued throughout subsequent periods.

The potters of the Pueblo II stage not only permitted the coils to remain on the necks of certain jars but manipulated them by pinching and indenting, with the finger nail or some sharp-pointed implement, in such a way that a corrugated effect was produced. This feature was carried to its ultimate conclusion in Pueblo III when the entire exterior surface of one large group of vessels was so treated. This indented corrugated ware had practically disappeared by the time the Spaniards arrived in 1540 and smooth surfaces for all forms of pottery were again in vogue.

The commonest classification for southwestern pottery, regardless of period or region, is one based primarily on function. This is not entirely satisfactory, but thus far it has not been possible to discover a better classification than that of the twofold culinary and nonculinary grouping. The use to which a vessel was to be put had a distinct bearing on its general character, form, and quality. A jar which was to be employed for cooking purposes had a different composition from those which were intended for other uses. Not only was this true but the surface treatment was also different.

The culinary pots of the prehistoric periods fall into four general classes, depending upon the horizon to which they belong. The oldest, those belonging to Basket Maker III, are smooth surfaced. Then came the banded necks of Pueblo I. The vessels with indented, corrugated necks and smoothed bottoms are the typical early Pueblo II form. Late in this horizon it became the custom to allow all of the coils to remain on the exterior. Jars of this form became the typical cooking pots of Pueblo III and early IV. In the latter horizon they gradually disappeared. Vessels of this type generally have soot-blackened exteriors as a result of use over an open fire. Occasionally one is found which had not been so employed and the color is a varying shade of gray.

The nonculinary groups throughout the various horizons are characterized by smoothed surfaces and some form of painted decoration. The latter varies considerably from district to district and from period to period. In the central, northern, and eastern parts of the area, from Basket Maker III to the end of Pueblo III, the group is composed of one major and four minor forms. The first is the well-known and widely distributed black-on-white pottery, light-colored vessels with a painted black decoration. The minor forms are black interior wares; red wares with black decoration; red wares with designs in black and white pigments; and polychrome wares, red with designs in yellow or buff bordered by black and yellow or buff with red and black ornamentation. In Pueblo IV the black-on-white gradually disappeared and the red and polychrome wares became predominant. The development of the latter presents an involved study which still calls for much field work. Since the requirements of this paper do not call for their consideration further discussion is not necessary.

The black-on-white wares have caused some confusion because of attempts to make too hard and fast rules of definition. The light-colored surface may vary from a dull gray to a chalky white and the pigment of the decoration ranges from a brownish-red to a good black. Firing had a great deal to do with the latter. A vessel which had been properly fired would have a good black decoration, a slight amount of overfiring would give a brownish-black, and a marked overfiring would produce a brownish-red hue. This may be attributed to the fact that over a large part of the area the chief material used in pigments was a mineral form. The tendency to overfiring was more pronounced in the earlier periods. After the technique had become better developed the results were more consistent.

Vessels of the black interior subgroup have three distinct classes. One consists of the bowls with gray to grayish-brown exteriors,

another those of a brownish-red hue, and the third black interior vessels with a red exterior. Each of the later forms seems to have been an outgrowth of the preceding one. The character of the black of the interior is correlated to a certain extent with the exterior color. The gray and grayish-brown bowls have a very dull black, in the next group there is a deeper tone to the black and it has a slight luster, while in the reds it is a good black and as a rule is quite highly polished. The differences are related to periods as well. The gray to gray-brown forms are Basket Maker III, the browns are Pueblo I and possibly early Pueblo II, and the reds late II and III.

The red vessels with black decoration have distinct characteristics for most of the periods. The earliest, those of Basket Maker III, were the result of an intentional overfiring of vessels which otherwise would have been of the black-on-white variety. This overfiring produced a color range varying from a yellowish-brown to an almost good red. During the Pueblo I period the use of a red slip was adopted, probably as the result of the development of the "liquid clay" wash for black-on-white wares. The color of these vessels was a rather light red with a slight orange cast. The decoration was in a thin, almost transparent black. Pueblo II and III vessels were a good red with a definite black design. In Pueblo IV the black pigment developed into a subglaze and finally a glaze due to the vitrification of certain elements in the pigment which fused when the vessel was fired. Out of this group developed the whole so-called glazed ware series of the Pueblo IV period. The term glazed ware refers only to the design as the vessels did not have a true glaze over the entire surface.

Late in Pueblo III in the Little Colorado area it became the custom to ornament the outside surfaces of bowls with broad heavy designs in white pigment. This developed into the practice of outlining the black decoration with white, a practice which carried over to some extent into Pueblo IV. In the latter period the red gradually gave way to an orange and then a light yellow, which in turn developed into the buff wares of the Hopi. The polychrome wares, which were contemporaneous with the black-on-red and white vessels, were in a broad sense only a variation of the red group. The earliest development of this kind of pottery seems to have been in the Pueblo III period, possibly in the Kayenta district of northeastern Arizona, where red vessels were ornamented with broad, yellowish-buff designs outlined with black. Another variation had a buff-colored paste with a red slip and black decorations. In this group the insides of bowls were completely covered with the slip while on the exterior it was manipulated in such a way that the paste was

permitted to show through in simple, heavy designs, the three-color effect being produced in this way.

The bulk of the pottery described in the following pages came from pit house and jacal sites. Only a small collection was obtained from the pueblo. The latter is sufficient, however, to show the distinct difference between the two groups. The contrast is not so marked from a material standpoint. There is some variation in the matter of temper and paste quality, but the outstanding features are those of the shape and style of ornamentation.

The culinary vessels of both groups had a coarse granular paste. The tempering material was largely ground stone with some admixture of sand. Curiously enough, there was a greater amount of the latter in the pueblo jars than in those from the pit houses. The nonculinary wares of the black-on-white group from the pit-dwelling horizon show a fine-grained paste tempered with some sand and particles of light-colored rock. They are quite brittle and have a tendency to flake off, so that it would seem a little too much tempering was used. The same class of wares from the pueblo has an even finer, more compact paste and was much harder in quality. Considerable use of potsherds for tempering seems to have been the rule. An occasional fragment suggests the use of ground stone, but this is not common. The paste of the black interior vessels is coarser, more porous in all periods. This was probably intentional in order that the smoke from the smothered fire in which they were baked might penetrate more easily into the surface and produce the black effect. The paste of the red wares was also coarser than that in the black-on-white group and was quite granular in cross section. The temper material in most cases was a dark-colored rock.

Where firing conditions were good the clay in the black-on-white pit-house vessels became a very good white; in fact, few sites in the Southwest have yielded pottery with so clear a surface tone. When underfired the bowl or jar had a light gray shade and there was a distinct dark streak in the center of the paste. The pueblo vessels of this group tended more consistently to a gray and the dark streak occurred more frequently in the paste. The red ware is characterized by three shades in the walls of the vessels. The center of the paste is dark. Bordering this on each side is a thin buff colored layer, while the exterior is red. This combination probably may be attributed to underfiring which left the dark streak in the center, the nature of the clay which was responsible for the buff color, and the use of the red slip which produced the exterior hue.

The surface finish on the vessels varies according to the group and period. The pit house culinary wares in most cases have smoothed surfaces, although they were not rubbed sufficiently to do

away with a certain amount of roughness. The cooking pots from the pueblo are of the indented corrugated variety. The nonculinary pit-house wares have comparatively smooth walls. The interior of the bowls was more carefully rubbed than the exterior, but even the latter seem to have been subjected to the polishing stone. The same group of pottery from the pueblo has even smoother surfaces. As stated previously, the practice of covering the surface of rubbed-down vessels with a coating of "liquid clay" was a Pueblo I development. The feature is so rare that it is practically nonexistent on Basket Maker III ceramics. The nonculinary vessels of the pit-house group show the presence of a slip on only 24.5 per cent of the specimens. This may be attributed to two factors. One is that the people were adopting the feature but that it had not yet become an outstanding characteristic. The other is that its development was retarded somewhat by the unusually fine quality of the clay. The latter made possible smooth surfaces and a good light background without the addition of "liquid clay" to which some white coloring matter, such as kaolin, had been added. In marked contrast to the pit-house group, all of the pueblo nonculinary wares had a slip.

A few of the specimens from the pit houses have an application of red wash, "fugitive red," on the exterior. This color was not permanent and rubs off rather easily because it was applied after the vessel was fired. For this reason it has been termed "fugitive red." Its use was widespread in Basket Maker III and continued for a time in early Pueblo I. After that it was only sporadic and by about the middle of Pueblo II had disappeared. There seems to be a correlation between the development of the slip and the fading out of "fugitive red." There was some use of both on the same vessel in late Pueblo I, but this apparently was a short-lived practice.

The containers from both the pit houses and the pueblo do not present a very great variety of forms. This seems rather strange in view of the diversity found in other sections. This is particularly true for the pit-house group. Elsewhere it has been found that the early period in ceramic development was characterized by many different shapes. The lack of variety for the pueblo may be due to the small number of specimens rather than to the actual lack of various types which are indicative of the period. This would not explain the condition for the earlier group, however, as the collection from it is sufficiently large to be a good representation of the horizon in that locality.

Culinary pottery from the pit-house stage shows some differences in form. There was one group which had a globular body and a short neck with slightly outcurving sides and wide orifices. (Pl. 11, *a*.) The vessels of this group had entirely smooth surfaces. A some-

what similar form also had the globular body, but the walls of the neck sloped inward to the orifice. (Pl. 11, *b*.) This apparently was the beginning of a neck form which was prevalent in the banded group. This particular class of vessels had smooth surfaces and were characterized by a narrow ridge around the rim of the orifice. Both of these forms are very suggestive of some of the culinary jars of the Basket Maker III period. The main difference lies in the fact that the necks of the latter are more squat, not so distinct.

Another style of pit-house cooking pot had a well-rounded but semiglobular body with a slightly depressed top from which the neck sloped upward and inward until it became vertical a short distance below the rim. There also was some banding around the neck. (Pl. 11, *c*.) In this example the manipulation of the bands was such that a slightly wavy effect was produced. This is a little unusual for this period. Most of the vessels have plain bands. A larger type of the banded-neck culinary vessel had a semiovoid body shape, a rather pronounced shoulder due to a tendency to depress the top of the body, and a neck with inward sloping walls. (Pl. 11, *d*.) The upturned handles on this specimen are rather unique. Occasional single or double loop handles are present, but this type is not common. In the outline of this jar, and also the preceding specimen, there is a marked suggestion of one of the water jar shapes in the nonculinary group which was extensively made throughout the Little Colorado region in the late prehistoric period.

Some of the smaller smoothed-surface pots were characterized by nubbin handles at the rim or orifice. These occurred singly or in pairs. When the latter was the case they were placed at opposite sides of the jar. The example illustrated is one which had two of these projections. (Pl. 11, *e*.) This is a treatment quite common on Basket Maker III jars of the type. This vessel is very similar to the latter in both form and finish.

There were two styles of pitchers in the culinary group. The predominant, and presumably the most characteristic one, had a full globular body and a short squat neck with a large orifice. (Pls. 11, *f*; 15, *b*.) The second form was that of a round-bodied vessel with a relatively long, segmented neck. (Pl. 15, *a*.) This shape was only occasionally made, judging from the examples and fragments found. The handles on both types were generally of the double strand variety, two fillets of clay placed side by side and welded together, although a single loop seems to have had a sporadic use. In most cases the handle extended from the rim of the orifice to the shoulder of the body. Now and then it was placed just below the rim but never well down on the side of the neck. The finish of

all three of these vessels is quite like that on the pottery from the Basket Maker III period. This is especially true for the pitchers with segmented necks. Except for the fact that their shape is not a typical Basket Maker form, they might easily pass for ware from that ceramic stage. The globular-bodied group have a shape which was characteristic in the latter horizon; in fact they may well represent a style survival from the Basket Maker III wares. A few of the pitchers had banded necks. Except for this feature, however, they were of the same shape as the globular-bodied specimens which are illustrated.

One small group of culinary vessels from the pit houses was characterized by incised lines around the neck of the jars. The shapes of the latter were like those of the plain surfaced pots. (Pl. 11, *a*, *b*.) Some of the vessels had a series of rings cut around the neck parallel to the rim of the orifice. These give the effect of a banded-neck jar. This feature is frequently observed on vessels of the early Pueblo period in the San Juan area. On other examples the incisions ran obliquely from the rim to the shoulder of the vessel. The fragments from one specimen showed that the oblique lines had run in two directions. This produced a latticework pattern around the neck of the jar. There were a few fragments from incised vessels which were very suggestive of those found by Hough in the pit village at Luna, N. Mex.[65] Unfortunately the Long H sites did not yield any complete specimens. With the exception of the pottery just mentioned, the potsherds show that the only difference between the incised forms and the smoothed-surface jars was that of the cut-in decoration.

The culinary vessels from the pueblo are all of the ware called indented corrugated. This feature on some of them, like on the typical Pueblo II jars, was confined to the upper part of the body and neck. (Pl. 12, *a*, *b*.) On the others, the predominant group, the indentations extended over the entire exterior surface. (Pl. 12, *c*, *d*, *e*.) The two main forms for the vessels were an elongated jar with rounded bottom and sides sloping inward to the orifice (pl. 12, *a*, *d*) and a full rounded body with short neck (pl. 12, *b*, *e*). Both types had an outcurved rim at the orifice. The elongated form seems to have been the common shape. No whole specimen of a large culinary jar was obtained. Those illustrated are of the smaller kinds, but fragments indicated that they had been of the elongated type, as represented by Plate 12, *a* and *d*. The rounded body group is quite similar to culinary pottery of the indented corrugated variety found in ruins of the upper Gila district to the south. They may

[65] Hough, W., 1920.

represent an influence from the district or even trade relations with its people.

The specimen, Plate 12, *c*, is an unusually fine one. The form was not in general use by the potters of the pueblo. The shape is very suggestive of certain small vessels found in the nonculinary group in a later stage in the Little Colorado area. Pitchers in the indented corrugated wares were represented by such fragmentary pieces that no description of their shapes is possible.

In addition to such ornamentation as the manipulation of the coils provided, culinary vessels were frequently further decorated through the use of appliqué figures. The latter usually took the form of spirals or volutes, although now and then an undulating fillet suggestive of a snake is observed. These elements were attached to the exterior while the clay from which the jar was fashioned was still moist. The potter simply welded the ornament to the side wall by pressing it into the surface. The figures were sometimes placed just below the rim, as in the case of the vessel illustrated in Plate 12, *a*, or again are found well down on the sides of the neck. This form of ornamentation was fairly widespread in the Southwest in Pueblo III. It was present in the Chaco Canyon, and Morris found it at Aztec and in the La Plata district of southern Colorado.[66] Nordenskiöld and Fewkes both secured examples from the Mesa Verde,[67] and Hough found a variant on the upper Gila.[68] Kidder and Guernsey report the practice on the culinary vessels from northeastern Arizona,[69] and an example from the Hopi country farther west is illustrated by Holmes.[70]

Another practice of this period, which no doubt was a survival from the earlier phase, was the embellishment of corrugated vessels with incised decorations. A design was cut into the surface with a sharp-pointed instrument. These decorations, judging from the fragments, were usually chevron or diamond-shaped figures. This style of decoration, like that of the appliqué ornaments, was fairly common in the Southwest. It occurred in the Chaco Canyon where some of the designs were quite elaborate,[71] and also along the upper Gila.[72] The percentage of such forms was not high at the Long H pueblo, however.

The vessels comprising the nonculinary group have a little more diversity of form than the culinary pots. Although the black-on-

[66] Morris, E. H., 1919 a, fig. 42, *a*; p. 71; 1919 b, pl. 38, *b*; pl. 39, *b*.
[67] Fewkes, J. W., 1911 b, pl. 23, *a*. Nordenskiöld, G., 1893, fig. 46.
[68] Hough, W., 1914, pl. 6, fig. 16.
[69] Kidder, A. V., and Guernsey, S. J., 1919, p. 142; pl. 58, *g*.
[70] Holmes, W. H., 1886, fig. 252.
[71] Pepper, G. H., 1920, fig. 121.
[72] Hough, W., 1914, pls. 6, 7.

white, black-on-red, and black interior containers might well be considered as separate classes, the overlapping of shapes is such that from the standpoint of form they may well be considered as a unit. In these wares the main vessels were bowls, seed jars, canteens, pitchers, and ladles or dippers. Large water jars, such as usually occur in these periods, were almost entirely absent. As a matter of fact, only a few fragments from one vessel were obtained from the pit houses. Not one other sherd from this horizon indicated such a jar. Conditions were not much better in the pueblo where the potsherds suggested that at most only three such vessels were represented. Meager as this evidence is, it is sufficient to show that the two forms were quite different; also that they were similar to some of those of comparable periods in other districts. Why there

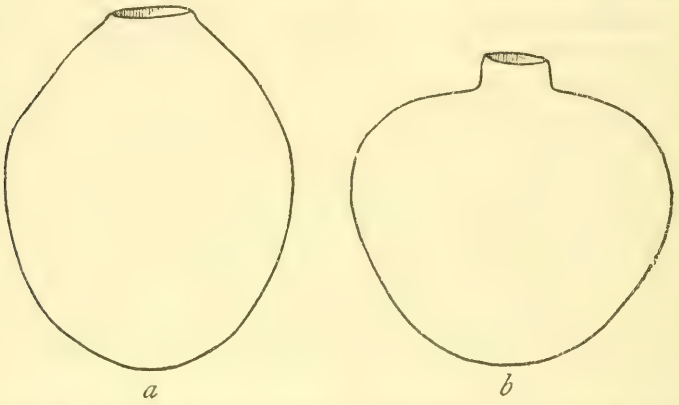


FIGURE 19.—Jar shapes in black-on-white wares: *a*, From the pit houses; *b*, from the pueblo

should have been such a scarcity of jars of that type is puzzling and there is no satisfactory explanation for their absence.

The fragments from the pit house showed clearly that the black-on-white jar had been one of the ovoid type with a very squat neck. (Fig. 19, *a*.) The latter was really little more than a pronounced rim to the orifice and not, strictly speaking, a neck. This type of jar was quite typical in the Pueblo I horizon in the Chaco Canyon and in slightly modified form carried over into the early stages of Pueblo II. Judd found a very good example of the type in one of the pit houses which he dug,[73] and many fragments from similar vessels may be seen in the refuse mounds of the old sites throughout the vicinity. The form is even present in the early pueblo horizon in the Piedra district of southwestern Colorado. The shape is one which is characteristic of the Chaco cultures during the early stages.

[73] Judd, N. M., 1924, pl. 4, *a*.

The jars from the pueblo were of the type which has a globular body with a slightly depressed top, short neck, and restricted orifice. (Fig. 19, *b*.) This form is more or less typical of the Pueblo III period throughout the San Juan area and is found to some extent in ruins on the upper Gila. As a matter of fact, it was quite widespread in the central, northern, and eastern districts of the Southwest area in late Pueblo II and the Pueblo III periods.

Seed jars, so called because the first examples found had seeds in them, were obtained only from the pit-house horizon and only in the black-on-white wares. This is not an indication that they were not in the area during the period when the pueblo was occupied, but simply that they apparently were not present in this particular ruin. The common shapes for this type of vessel were an ovoid and a globular body with a depressed top. (Pl. 13, *b*, *c*, *e*.) Another form had the globular body with only slightly depressed top. (Pl. 13, *f*.) This was not a general type, however. Only one example of the double-lobed seed jar was found. (Pl. 13, *a*.) This form is not unique but it is only occasionally found. This specimen came from a burial in the refuse mound belonging to one of the jacal sites and possibly represents a somewhat later development than the others.

Two of the specimens illustrated (pl. 13, *b*, *e*) have small lug handles placed at opposite sides near the shoulders of the vessels. In both cases the lugs had vertical perforations. Thongs passed through the holes would have made it possible for the owner to hang the vessel on a peg or from the ceiling of the house where it would be out of the way. There is no direct evidence, however, to show that they were so used. One of the seed jars (pl. 13, *c*) had a single loop handle on one side. Why the potter did not make another opens a wide field for speculation, but any postulation would probably fall short of a true explanation, hence it will have to suffice to call attention to the feature.

All of the seed jars in the collection show that the lip of the orifice was smoothed from the outside toward the interior of the vessels. This seemingly minor point is of significance because it illustrates a period difference. The seed jars of the Basket Maker III ceramic stage are more globular in form than the later type, but in addition the lip of the orifice was smoothed by rubbing upward and outward from the interior. As a result a slightly perceptible ridge was left on the outside of the orifice. In a collection where many of the ceramic features suggest the Basket Maker III period this definite Puebloan trait is of importance in that it augments other evidence which points toward a later horizon.

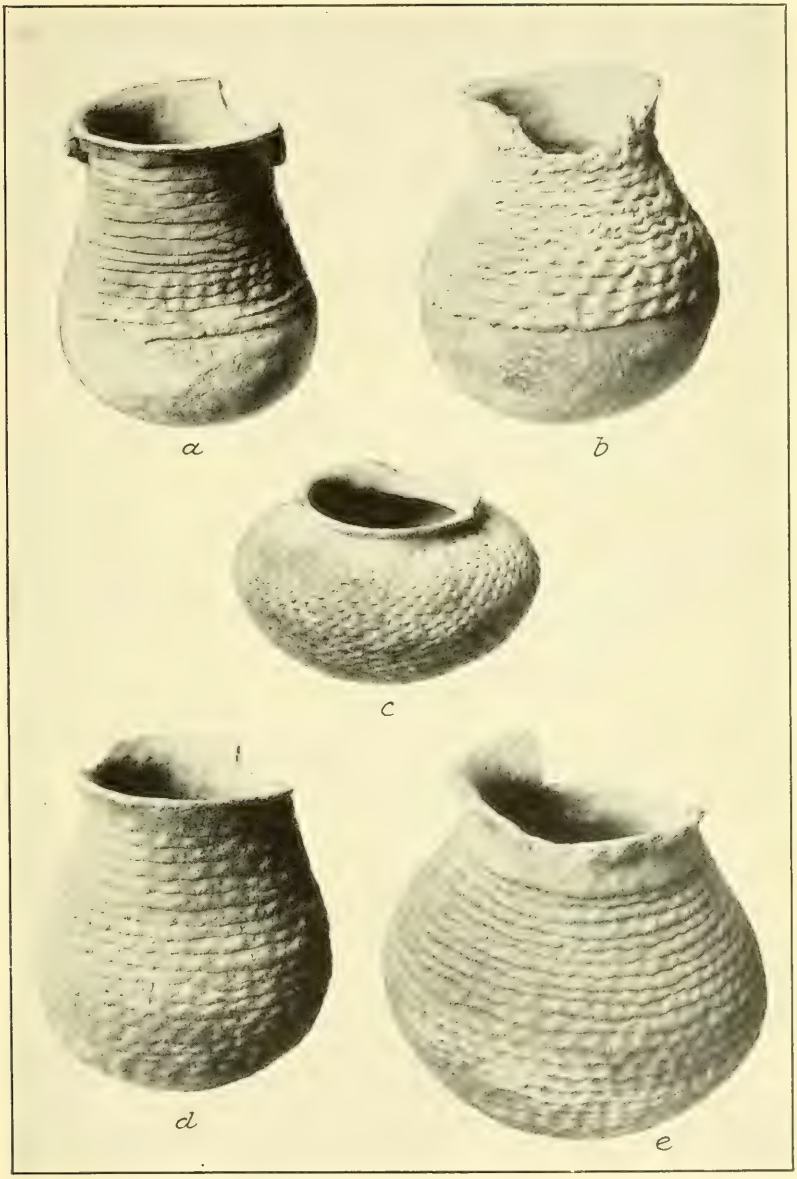
The main distinction between canteens and seed jars lies in the fact that the former has a much smaller orifice and generally lacks the depressed top. The body form is more consistently globular and generally there is at least the indication of a neck for the vessel. Curiously enough only one whole specimen of this class of vessels was secured from each horizon, but a number of potsherds from the pit houses and the pueblo were from containers of this kind and they showed that the forms of the intact specimens were typical of the horizons from which they came.

The pit-house style seems to have been a slightly pear-shaped vessel. The body was quite globular but tapered up to the orifice in a short, conelike neck. (Pl. 13, *d*.) The pueblo form was decidedly globular and had a definite though very short neck. (Pl. 14, *c*.) Both forms had handles. Those on the pit-house specimen were lugs with vertical perforations. The pueblo pot had low loops

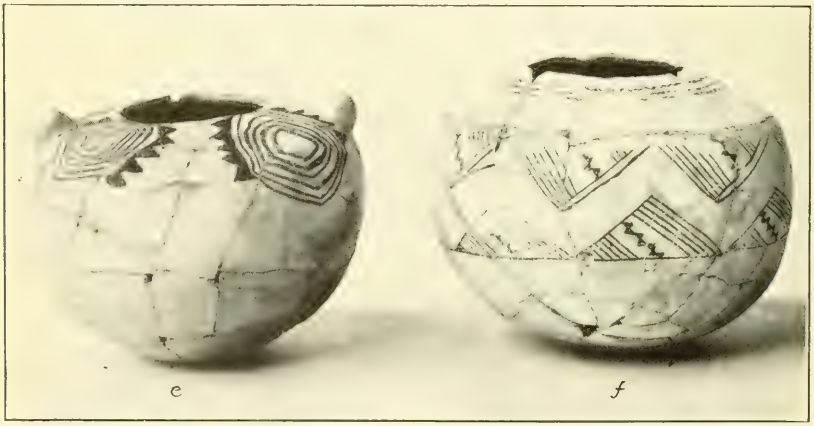
FIGURE 20.—Pitcher shapes, black-on-white wares: *a*, Pit house; *b*, *c*, pueblo

which did not project above the surface to any great extent. They were not perforated, but the natural opening formed by the loop was augmented by a depression in the wall of the vessel.

There were several different pitcher forms represented in both the pit house and pueblo horizons. One characteristic black-on-white shape was that of a globular body with a tapering neck and only a slight suggestion of a shoulder. (Pl. 15, *c*.) This was quite a common form in the early period. Another rather typical vessel of this group and horizon was one with a full globular body, a tapering conical neck, and a small orifice. Around the shoulder on this type of pitcher was a series of conical projections or nubbins. (Fig. 20, *a*.) The number of these nubbins varied. On some there were two, others had four, and the fragments from one example showed that it had had 16. One specimen had distinct mammæ represented in the nubbins. The projections were formed by pushing out the wall of the pitcher from the inside while the clay was still moist. None of them were the result of additional lumps welded onto the vessel. The projecting nubbin feature on these specimens is identical with



CORRUGATED CULINARY JARS FROM THE PUEBLO



BLACK-ON-WHITE SEED JARS AND CANTEEN FROM THE PIT HOUSES

PITCHERS AND CANTEEN, BLACK-ON-WHITE WARES, FROM THE PUEBLO

PITCHERS FROM THE PIT HOUSES

that on some of the pitchers from the pit houses at Luna, N. Mex.[74] As a whole the feature seems to have had a rather widespread though somewhat sporadic distribution in the early pueblo period.

The double pitcher (pl. 15, *d*) is an unusual form. Its general outline is quite like that of the rounded body, tapering neck group. But the segmentation produced by the vertical depression running around its center and the partition in the neck make it distinct. The body was not divided into two sections on the inside. The partition wall in the neck only extends down to the shoulder line. This is the only example of the form found in the Long H Ranch sites and no fragments were obtained from similar pitchers. The specimen belongs in the pit-house group.

Bird-shaped vessels were fairly common. Only one complete specimen was secured but there were many fragments from similar containers. (Pl. 15, *e*.) The type for this locality seems to have been that of the full, plump, bird-shaped body. There were no indications of head, wings, or tail such as frequently may be observed on specimens from other districts. The shape was apparently restricted to the pit-house horizon at this location. No suggestions of it were found in the potsherds or vessels from the pueblo. Bird-shaped pitchers had a wide distribution in the Southwest in practically all periods. Many times there is only the representation of the body, as in the example illustrated, and again the latter is so supplemented by additional features that it unmistakably depicts some kind of bird.

Several forms of pitchers were obtained from the pueblo and they are noticeably different from those of the older level. It may be said in general that the necks are longer with more vertical sides and less constricted orifices, and the bodies are proportionately smaller, more ovoid in outline. One of the earlier examples of this type is illustrated in Plate 14, *a*. Here the body is still somewhat globular, but it has a distinctly depressed top and a rather pronounced shoulder. The sides of the neck have a slight inward slope, but it is not as pronounced a one as in the pit-house specimens. The outline drawing (fig. 20, *b*) of another vessel in this group shows a variation of the form. The latter is one which is quite common both along the upper Gila to the south and in the Chaco Canyon to the northeast.[75]

The ovoid body type with vertical sided necks has several variations. One rather common form is that which is illustrated in Plate 14, *b*. A great many of the potsherds from the various refuse-

[74] Hough, W., 1920, fig. 41.
[75] Hough, W., 1914, pl. 9, 2. Pepper, G. H., 1920, fig. 70.

filled rooms in the pueblo showed that they were from this kind of pitcher. Later the form became more pronounced and the necks were decidedly elongated and the bodies still smaller. The shape in the black-on-white group is shown in Figure 20, *c*. This is a typical Chaco Canyon form, one which was found in the ruins at Aztec, and which is also present along the upper Gila.[76] It is a pitcher shape which is typical of the Pueblo III horizon, especially in the Chaco and bordering cultures.

The pitchers of the black-on-red group also have the long, vertical sided neck, but the bodies tend to be slightly more globular in form. (Pl. 16, *a*.) The example pictured is characteristic of the Long H pueblo and also of the region in general.[77] There were no pitchers of this class in the pit-house wares and no black interior vessels of the form in either horizon.

The handles on a great majority of the pitchers in the painted wares were of the flat, or oval, single-loop variety. A few fragments showed that in some instances they had been of the zoomorphic type. It was not possible, however, to determine what animals had been represented. This style of pitcher handle is one which is rather prominent in the upper Gila region. It was present in both the pit house and pueblo groups. The main distinction to be observed in all handles is that those on the pit-house pitchers characteristically extend from the rim of the orifice to the shoulder, while those on the pueblo vessels are joined to the neck some distance below the rim. This difference was not a local development but a period style which may be observed on vessels of similar horizons from other districts.

Bowl shapes are not greatly diversified. There are two main forms. One has an approximately hemispherical shape, the depth being half or somewhat less than half of the diameter. (Pls. 16, *b*; 17, *a*, *c*, *d*, *e*.) Only rarely is an extremely shallow bowl to be observed. The other group consists of the vessels whose depth is greater than half of the diameter. The latter have a noticeable incurve to the walls below the rim. (Pl. 17, *f*.) The first form is found in all of the various kinds of pottery, but the second is confined to the black-on-white wares. It does occur in both horizons, however, although it is more prevalent in the pueblo wares.

On practically all of the pit-house specimens the rims are rounded and the walls of the vessels are somewhat thinner for a short distance below them. Around the circumference the rims tend to be uneven and wavy. This feature is quite common in the early pottery stages. The rims of the pueblo bowls were usually flattened, in some

[76] Hough, W., 1914, pl. 9, *l*. Morris, E. H., 1919 a, fig. 50, *b*. Pepper, G. H., 1920, fig. 70.

[77] Hough, W., 1903, pl. 36, no. 212508.

cases almost squared, and the walls of the vessels have approximately the same thickness at the rim as elsewhere.

All of the bowls, regardless of the horizon, show a better finish on the interior than they do on the exterior. This may be attributed to the fact that the designs were applied to the inside surface and for that reason it was more carefully smoothed. A distinguishing feature between the bowls from the pit houses and those from the pueblo is that most of the latter had a slip applied only to the interior. If the pit-house vessels were treated with a slip it was placed on both the inside and outside of the bowls. In the pueblo group an occasional specimen shows that the slip was carried down a short distance below the rim on the outside but not over the entire surface. This practice was also a very common one at one stage in the Chaco Canyon. The tables in the appendix give measurements for all of the vessels illustrated and since the size range of the bowls may be obtained from them there is no need to discuss it at this point.

Ladles or dippers had two main forms in the pit-house pottery. The commonest was that of the half gourd, or as it is sometimes called when found in slightly modified shape, the two compartment. (Pl. 18, *a*.) There were simplified variations of the style in which the vessels more nearly approached the bowl type of container. On the latter the handle was little more than a slightly raised and extended portion of the rim. (Pls. 17, *b*; 18, *b*.) The other group in the pit-dwelling series was that of a bowl with a solid concave handle. (Pl. 18, *c*.) Specimens of this style were not as numerous here as in other districts. They were confined to the black-on-white group. No black-on-red ladles were found. The half gourd form is very characteristic in collections of pottery from early horizons. It presumably made its appearance at about the beginning of the Pueblo I period; possibly it was developed at the very end of Basket Maker III. The form is found in the Chaco Canyon, in the La Plata region in southwestern Colorado, at sites on the Navajo reservation, in the Kayenta district of northeastern Arizona, and occasionally in older ruins along the upper Gila.[78] The solid handle form has about the same distribution.

No whole specimen of a ladle was obtained from the pueblo. Such fragments as were present in the potsherds, however, showed unquestionably that the characteristic form for this type of vessel had been one with a tubular handle attached to the bowl. The handle was quite cylindrical in form and apparently always hollow. Frequently a series of small holes had been punched along the upper side. These probably were to permit a certain amount of expansion

[78] Kidder, A. V., and Guernsey, S. J., 1919, pl. 58, *d*. Morris, E. H., 1927, fig. 28; fig. 30, *b*.

and contraction during the firing of the vessel and to guard against the handle cracking in the process. This form of ladle is characteristic of the Pueblo III period in the central and northern regions and it is very easy to distinguish it from earlier types.

DESIGNS ON THE PAINTED POTTERY

The decorations on vessels of the nonculinary group were placed on the interiors of bowls and ladles and on the exteriors of large jars, pitchers, seed jars, and canteens. In only one instance was there a design on the exterior of a black-on-white bowl and the latter came from the pit-house horizon. (Pl. 17, *f*.) This feature is rare in the early stages, but it is frequently observed on vessels of the Pueblo III period, especially those from the northern San Juan region. None of the pueblo bowls of this class of pottery at the Long H Ranch had it. Fragments from black-on-red bowls from the pueblo showed that they were occasionally so treated, but even in that group the practice was not as common as in other districts of the Little Colorado area. This feature, however, is one which may be attributed to a time element. The ruins from which the pottery normally bearing it comes are of a somewhat later date. This fact has been shown by stratigraphic studies in a number of places and also by the statistical survey of the Little Colorado sites made by Spier.[79] A few fragments from red bowls with white and black and white exterior decorations were found on the Long H site, but not one such potsherd came out of the pueblo. This fact is significant from the standpoint of the position of the ruin in the Pueblo III horizon.

The outstanding characteristics of the decorations on the black-on-white vessels of the pit-house group are in the style of pattern and the elements used. There are no black-on-red specimens for this horizon. The designs are formed from zigzag, parallel, and parallel stepped lines; ticked or dotted lines; squiggled lines; filled-in triangles and ticked triangles; tipped triangles or the so-called bird symbols; volutes and ticked volutes; interlocking rectilinear and curvilinear frets; checkerboard patterns; and concentric rectangular and circular figures. These elements were combined in many ways to make pleasing and typical decorations. There was not a single realistic or life-form element in any of the designs. This is rather curious, inasmuch as such figures were frequently used by the potters of earlier and similar horizons in the region farther north.[80]

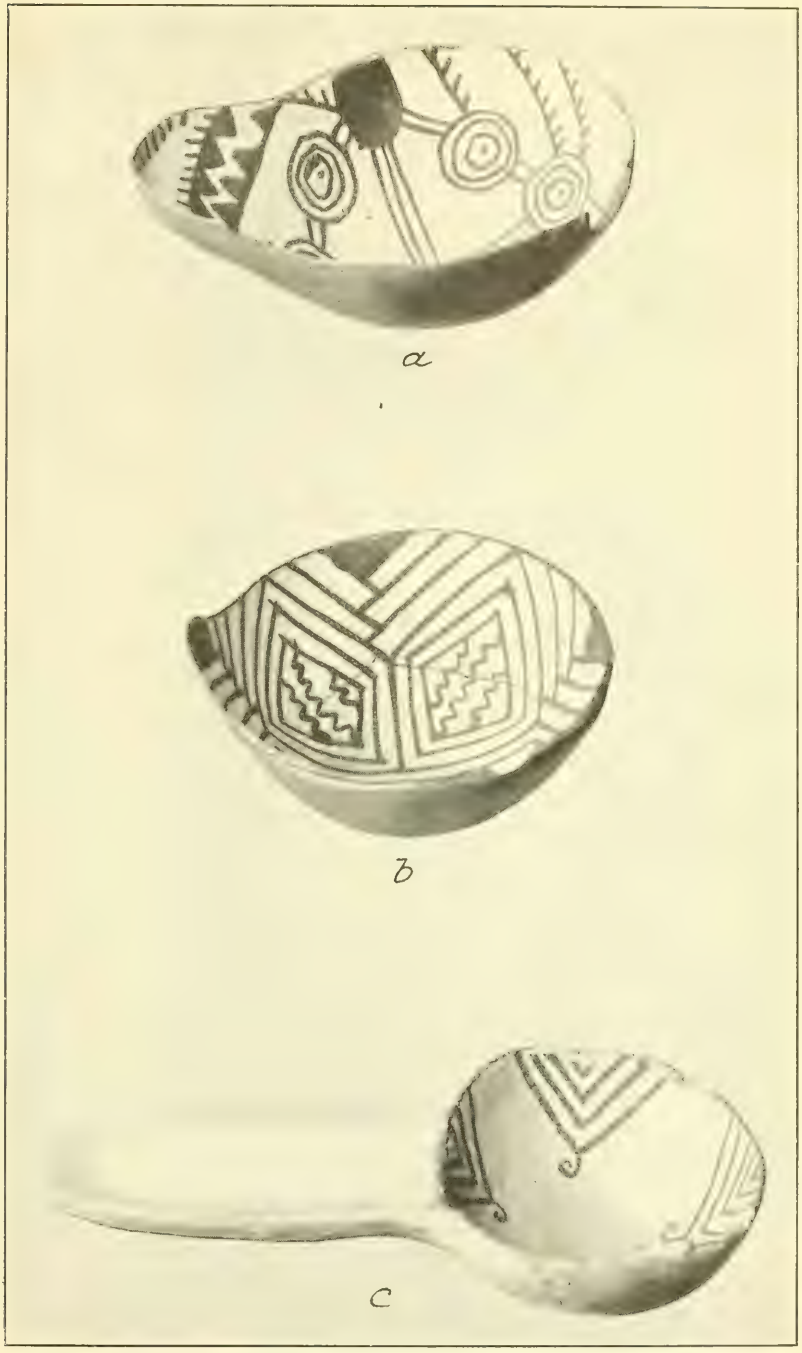
The most popular patterns for bowls seem to have been those of the quadrate form, although occasional examples are found where

[79] Spier, L,. 1917, 1918.

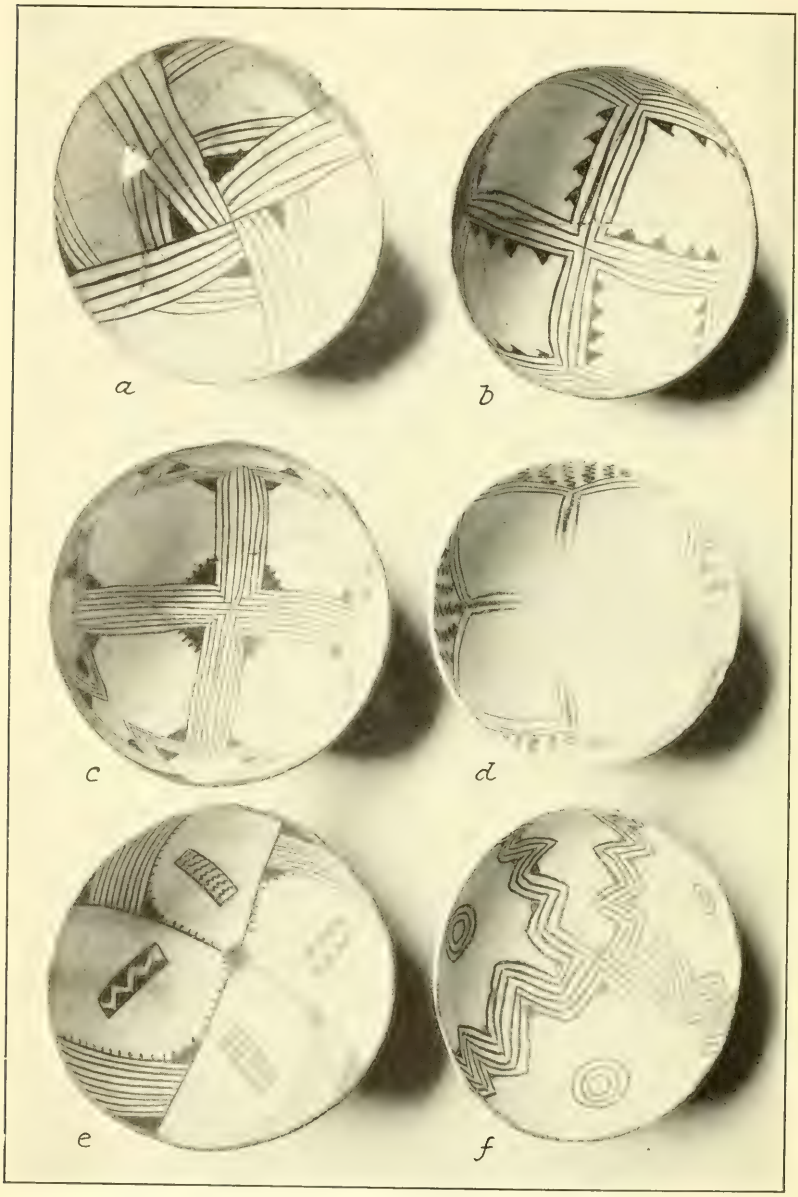
[80] Morris, E. H., 1927, fig. 22, *a* and *b*; pp. 193–194. Roberts, 1929, pp. 122–123.

BLACK-ON-RED WARE VESSELS FROM THE PUEBLO

BOWLS FROM THE PIT HOUSES



LADLES OF BLACK-ON-WHITE GROUP FROM PIT HOUSES



PIT-HOUSE BOWLS WITH QUARTERED PLAN OF DECORATION

the interior of the bowl was bisected by the design. There is only one example of the tripartite plan of decoration in the entire collection of specimens from the pit houses. Next to the quartered designs in numerical quantity are those which consist of solid elements pendent from the rim and bordered by series of parallel lines. Then there is the group composed of pairs of similar figures placed at opposite sides of the field for decoration. Patterns of this style are about equally divided between those with two figures and those with four. One type of ornamentation consisted of spiral figures beginning at the center of the bowl and continuing out to the rim. Still another group shows a series of pendent panels around the sides of the interior extending from the rim toward the bottom of the vessel. These panels are generally triangular in shape and the usual numbers are three or four. Another fairly popular plan of decoration was that of the band designs. The latter usually comprise a series of repeated elements placed around the sides of the bowls. These figures were frequently enclosed in framing lines. A fairly large number of vessels had figures placed in the bottom of the bowl or occupying what may be considered the center of the decoration.

The lips or rims of all of the bowls were painted. On many of them the edges are so abraded that it is not possible to determine whether they were continuous or had a break. Where the pigment has not been rubbed off the line completely encircles the bowl, producing what may be considered as a frame for the entire design. This would indicate that the practice of leaving a small portion of the rim unpainted, the line break, was not common at that time. This break has a number of explanations. Some of the modern Pueblos believe that it would bring misfortune upon them if the line was made continuous, while others say that if the circle was completed the spirit of the vessel would not be able to pass in and out at will and as a result the bowl would crack. The line break is a pronounced feature in the Pueblo III period, particularly in the Chaco range of cultures.

Decorations on seed jars, pitchers, and canteens were generally of the band form during the pit-house stage. These bands were placed around the shoulder of the vessel, the region of its greatest diameter and the beginning of the depressed top or neck, and bordering the orifice. Sometimes only one of these zones was used, then again both were ornamented, or occasionally a single broad band was painted from the shoulder to the orifice. Only one example did not have the band style of pattern. On this specimen there are four approximately similar but not identical figures placed on the portion of the jar between the shoulder and the orifice.

Two examples of decorations in which the bowl was bisected by a single central portion of the design are illustrated in Figure 21. The center of the bowl in *a* is crossed by a series of parallel lines which connect the two figures placed at opposite sides of the field for decoration. These central lines also connect some of those which border the triangular figures. This design is a good illustration of the manner in which two simple elements, parallel lines and volutes, may be combined to make a pattern which is fairly elaborate. The decoration on *b* is more extensive and covers a greater proportion of the interior surface of the vessel. It really is a combination of two forms of ornamentation, the band and the bisecting figure. The series of solid pendent triangles around the rim and the bordering

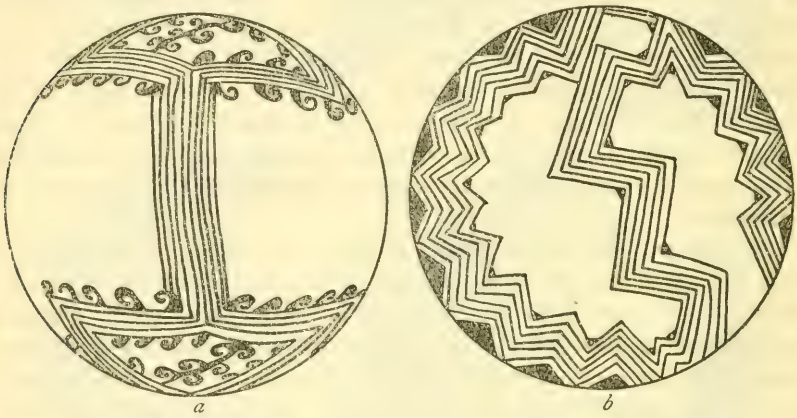


FIGURE 21.—Designs, black-on-white bowls of the pit-house group

parallel lines is typical and often is found alone. (Pl. 20, *f*.) Designs of this type are common in both the late Basket Maker III and Pueblo I horizons.[81] The zigzag device, which is composed of seven parallel stepped or zigzag lines, which cuts across the approximate center of the bowl, is very reminiscent of one of the characteristic forms of ornamentation on bowls of the Basket Maker III period.[82] This particular design is interesting because of certain irregularities in the number of bordering lines and also on account of the fact that it was not completed. The latter feature is shown at the lower right hand side of the drawing. (Fig. 21, *b*.) The filling in of the angles of some of the parallel bordering lines is a feature which is typical of the designs of the Pueblo I period. Many examples show this in a more pronounced way than does this one. This may be observed in some of the decorations discussed in following paragraphs.

[81] Morris, E. H., 1927, fig. 24, *a*. Roberts, 1930, fig. 34.
[82] Morris, E. H., 1927, fig. 23, *d*; fig. 38, *b*. Roberts, 1929, pl. 15.

Quadrate bowl patterns have many forms. Typical examples of this style of ornamentation are illustrated in the photographs of bowl interiors in Plates 19 and 20, *a* and *b*. The specimens in Plate 19 show characteristic use of parallel line, dotted line, squiggled line, triangle, dotted triangle, bird symbol, and concentric circular elements. The two in Plate 20, *a* and *b*, are somewhat more elaborate. The latter are particularly suggestive of a style of decoration found in an early level in the Chaco Canyon and have numerous counterparts in the Pueblo I pottery of the Piedra district in the northeastern San Juan Basin in southern Colorado. The chief elements in these two designs are parallel lines, squiggled lines, solid triangles, dots, and interlocking volutes. The squiggled lines were used in hachure figures. These are quite typical of the Pueblo I period, particularly its later phase, and represent the prototype of the later prevalent straight-line hachure. On the pottery of the Chaco Canyon which was made during the stage when Pueblo I was shifting to Pueblo II figures of squiggled hachure were the predominant element in decoration. They had not attained that prominence, however, in the pit-house horizon in the Long H Ranch district.

Additional forms of the quartered style of decoration are shown in the drawings of Figure 22. The original designs have not been idealized in the slightest. They were copied as exactly as possible with all of the irregularities and mistakes which actually are present. Too often the tendency in reproducing the decorations from pottery is to perfect the original and for that reason much of the true feeling, the Indian character, of the design is lost. The patterns *a*, *c*, and *d* are typical Pueblo I decorations. That shown in *b*, however, is much more suggestive of some of the textilelike designs on Basket Maker III vessels. The latter is of interest because the potter failed to complete the painting in of the solid triangular elements, although the spaces where they were to have been were outlined. This bowl also illustrates a form of the ticked-line element, one which became quite prevalent in late Pueblo I and carried over for a time in Pueblo II.

Designs *c* and *d*, Figure 22, are very similar to ones of the same style of decoration found in the Chaco Canyon and also in the northeastern San Juan Basin. Fragments from vessels from the upper Gila and even from the older horizon in the Mimbres region in New Mexico have been observed with elements and figures indicating that the *c* and *d* styles were present in those localities. This is of significance because it shows that in the early period of the Pueblos the black-on-white decorative patterns were widespread. It

was not until the late Pueblo II and Pueblo III stages were reached that there was the pronounced development of characteristic and specialized local forms.

The quartered designs discussed in preceding paragraphs are all of the balanced type. That is, similar elements and figures, even though they were not identical, were placed in opposite quadrants in such a fashion that the decoration was balanced. The potters did not always do this, however, and occasionally a vessel will be

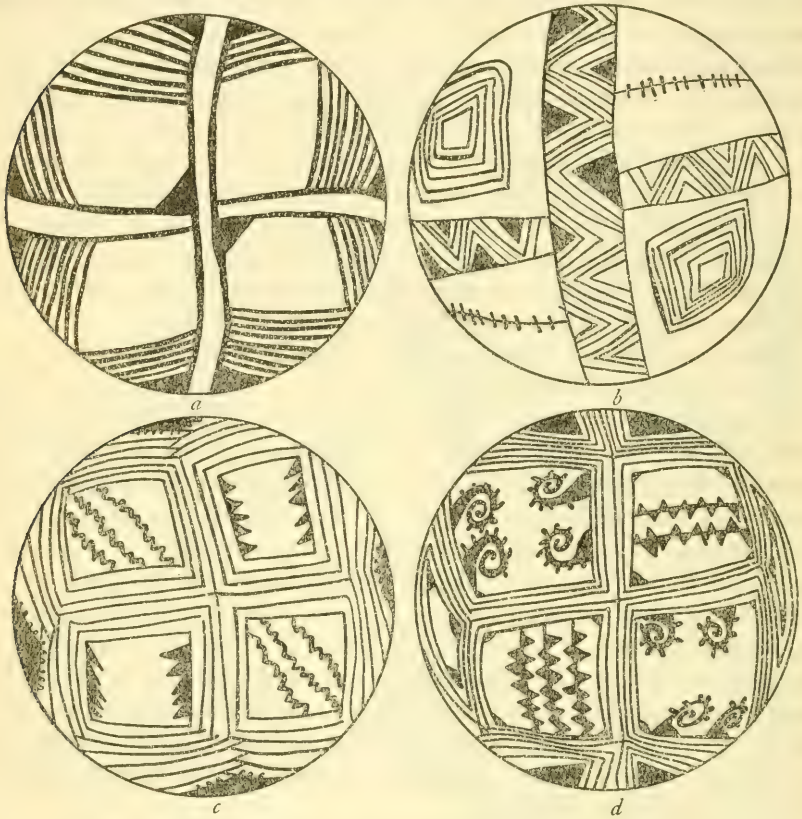
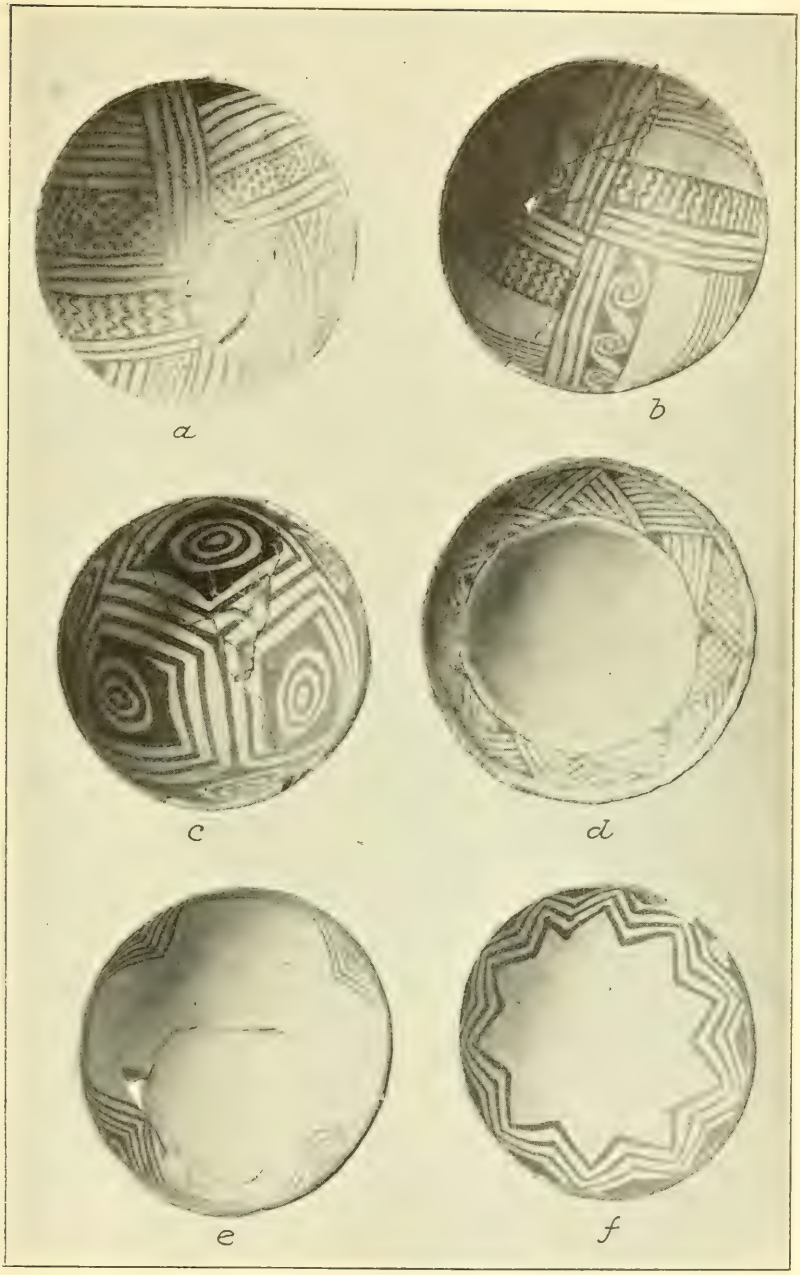


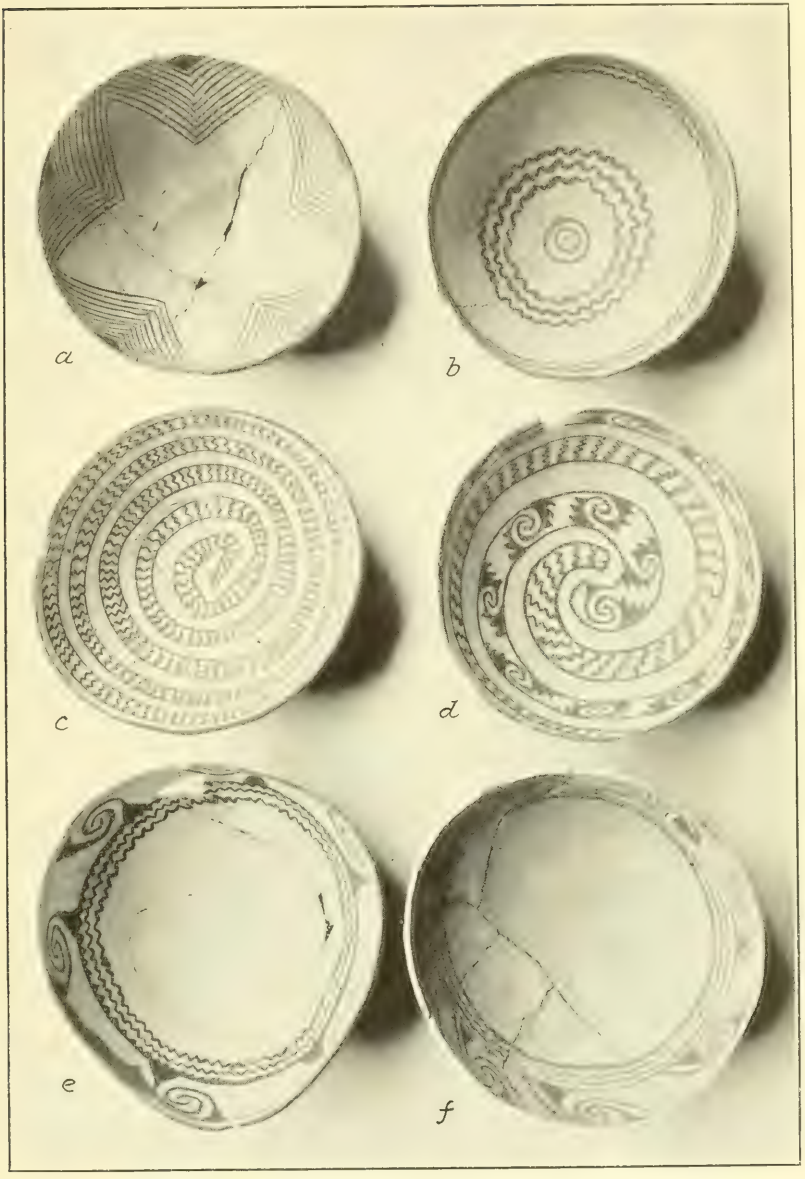
FIGURE 22.—Examples of quartered designs from pit houses

found with a design which has an entirely different device in each sector. A characteristic example of this kind of ornamentation is illustrated in Figure 23, *a*. Here the field for decoration was marked off into 4 sections by 2 sets of 2 parallel lines crossing the approximate center of the bowl and intersecting each other virtually at right angles. The quarters thus formed were then filled in with figures. No two of these are even the least bit similar. The elements used were simple parallel lines, solid triangular figures, and tipped triangles. The same elements were used in painting

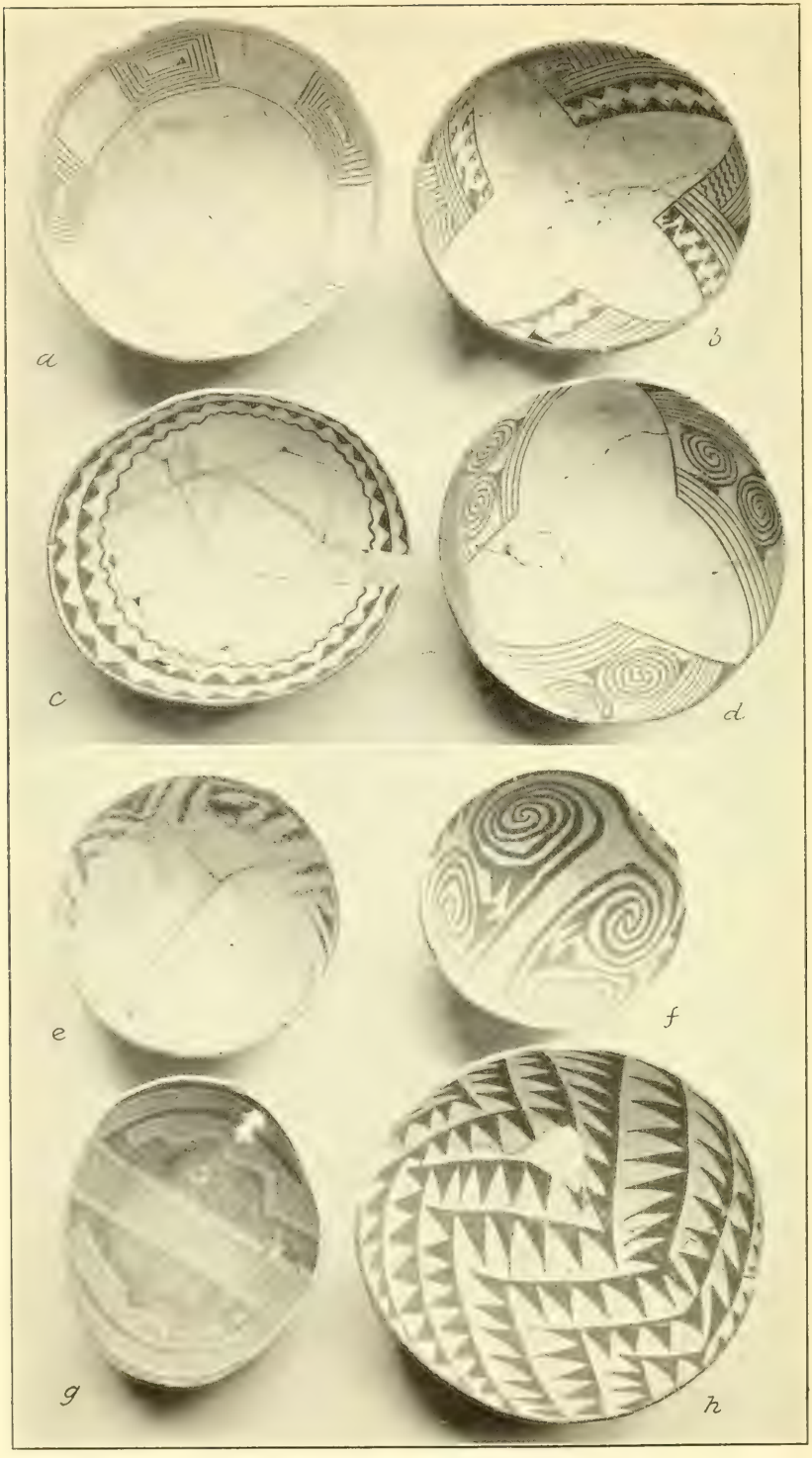


BLACK-ON-WHITE BOWL DESIGNS, PIT-HOUSE VESSELS

DECORATIONS ON BLACK-ON-WHITE BOWLS FROM THE PIT DWELLINGS



BLACK-ON-WHITE BOWLS FROM THE PIT HOUSES



BOWL INTERIORS

a–d, Pit houses; *e–h*, from the pueblo.

the design illustrated in Figure 23, *b*. The latter represents an elaboration of the bisected type of decoration. The devices in the two halves of the bowl are somewhat similar, but still they are different. In the broad sense, however, the design may be considered as representative of the balanced form.

The only example of a tripartite design was on a small bowl which came from a burial in the refuse mound of the Group 1 pit houses. The decoration in this instance (pl. 20, *c*) is much bolder and more like some of those in later periods. To some extent it suggests a rudimentary form for some of the so-called Proto-Kayenta wares of the Pueblo III horizon. This design was well balanced. In each of the three sectors is a figure similar to those

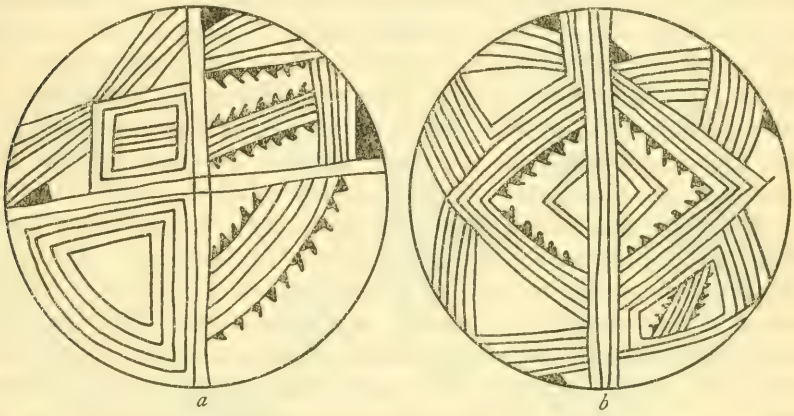


FIGURE 23.—Quartered and halved patterns, pit-house series

in the others. At the upper ends of the three lines which meet at the center of the bowl and trisect the field for decoration are three triangular figures which are practically identical.

Designs formed by solid figures outlined by parallel lines are as characteristic of the pit-house decorations as the quadrate plan of ornamentation. The solid elements are generally pendent from the rim of the bowl, and the series of bordering lines appear below them. Typical forms are illustrated in Plates 20, *e*; 21, *a*, *b*, *c*, *d*. The bowl shown in Plate 22, *a*, might possibly be considered as belonging to this group, but as a matter of fact it really should be included with the pendent panel group because the bordering lines are not continuous. The rather elaborate ornamentation in bowl *a*, Plate 21, is a style which was one of the first to be recognized as typical of the Pueblo I period. Even the minor characteristic of the stepped lines overrunning the corners, not meeting in perfect junctures, is an outstanding Pueblo I feature. Designs of this type are to be found on vessels from the Kayenta district in northeastern

Arizona,[83] they occur frequently on bowls from the earlier Chaco Canyon levels,[84] and are to be observed on specimens from the northeastern San Juan Basin in Colorado.[85] The simpler forms, such as those illustrated by *e*, Plate 20, and *c* and *d*, Plate 21, are more numerous in the pit-house decorations from the Long H Ranch. The more elaborate style was a later development and had not yet become predominant at the stage of the sites under consideration in this report.

Designs consisting of similar figures placed at opposite sides of the bowl seem to have been, in general, of the balanced variety. Although some examples have but two while others have four, the opposing devices are similar. Rarely can they be called identical, however. An example of the 2-figure style is shown in Plate 21, *e*. On this specimen the two symbols placed at opposite sides of the bowl are to all intents and purposes the same. They consist of concentric, 4-sided or lozenge-shaped figures. These are composed of a central quadrilateral, two sides of which are augmented on the interior by tipped-triangular elements, inclosed in three others. The number of the triangular elements in each is not the same. One has 5 and 6, while the other has 4½ (the fifth was not completed) and 5. Despite this difference the effect produced is the same. The main figures are connected to the rim at the opposite sides of the bowl by series of four ostensibly parallel squiggled lines. One corner of each of the main symbols is touched by a solid dotted triangle which is pendent from the rim. Here again only a few simple elements were used. They are the parallel lines, squiggled lines, tipped triangles, and dotted triangles.

The 4-figure form of opposing symbols is illustrated by Plate 21, *f*. This is not an exactly typical example, however, as two of the figures are pendent from the rim instead of being placed down on the wall of the vessel as is generally the case. There are two kinds of figures in this design. One is a triangular device pendent from the rim and the other a 4-sided lozenge or diamond-shaped figure. Those of each kind are at opposite sides of the vessel, so that the pendent triangles balance and the lozenges do likewise. The lozenge symbols are practically alike, but although their general forms are similar there is a distinct difference in the central portions of the triangular devices in that at the lower side of the bowl (pl. 21, *f*) the central panel consists of a series of squiggled lines. The same portion of the figure at the other side has two rows of opposed triangles. The

[83] Kidder, A. V., 1924, pl. 34. Kidder, A. V., and Guernsey, S. J., 1919, pl. 63, *b*, *g*.
[84] Judd, N. M., 1924 fig. 6. Kidder A. V., 1924, pl. 22, *g*.
[85] Roberts, 1930, fig. 35.

elements used in forming the symbols were parallel lines, dotted lines, squiggled lines, triangles, and tipped triangles.

Spiral designs provide one of the interesting features in the decorations on this pottery. They may consist of a single figure or of contrasting ones. The devices start from the center of the bottom of the bowl and radiate out to the rim. A characteristic example of the single figure form is shown by bowl *c*, Plate 22. This design has a spiral of squiggled hachure. Frequently a decoration of this style is referred to as symbolic of a coiled snake. As a matter of fact it is more suggestive of a coiled basket. Since so many of the decorative elements used on the pottery of the Pueblo periods were copied from baskets it seems logical that an occasional piece might represent such an object. The contrasting form is shown in *d*,

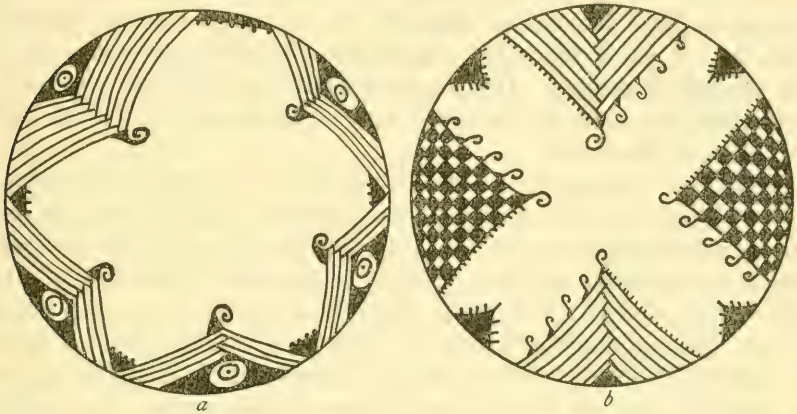


FIGURE 24.—Pendent panel designs in pit-house decorations

Plate 22. One of the spiral figures is of the squiggled hachure type, while the other is composed of interlocking ticked volutes. Both of these designs are suggestive of decorations on early Chaco Canyon pottery and also to a certain extent recall some of those from the upper Gila.

The pendent figure style of design is not as prevalent on the bowls from this locality as it is in some of the other districts. It also seems to have been confined to the use of triangular elements. One curious feature about this form of decoration is that in almost every case the pendent figures form a negative pattern in the unpainted portion of the bowl. Two good examples of pendent triangle designs are shown in Figure 24. The decoration *a* is composed of five figures which consist of solid triangular elements pendent from the rim and bordered by series of parallel lines. The latter differ from those in the decorations previously described in that they are not con-

tinuous. The open spaces in the solid triangles which were filled with a circle and dot, a "bull's-eye" element, present a feature in design which was prominent on vessels of the transition period, the shift from Pueblo I to II, in the Chaco Canyon. The manner in which the parallel lines were joined, so that they suggested folded strands, is rather characteristic of the locality. The volutes at the points of the triangles and the filled-in corners forming dotted triangles are also typical.

Pendent triangular figures of contrasting nature were frequently used, and the design produced by them is very effective. A good illustration of this kind of decoration is shown in *b*, Figure 24. Here there are four main devices, two of them of checkerboard pattern and two formed from solid elements outlined by a series of lines. The spaces between the main figures were filled with ticked triangles. The bordering lines of the upper and lower triangles (fig. 24, *b*) show the same suggestion of folded strands noted in the preceding design. The presence of the volutes and also of the dots along the sides of the main figures illustrates one of the many uses of such elements.

Additional examples of pendent figures are shown in Plates 22, *a*, and 23, *b* and *d*. These specimens illustrate quite clearly the negative pattern feature. In Plate 22, *a*, there is a distinct 5-pointed star. A 4-pointed pattern, possibly a 4-petaled flower, appears in Plate 23, *b*, and in Plate 23, *d*, there is an example of the 3-petaled form. The triangular figures in these three designs show a variety of elements. There are five similar devices, solid triangles outlined by parallel lines, in Plate 22, *a*. Three similar figures composed of parallel lines, solid triangles, and connected volutes, constitute Plate 23, *d*. Four devices of opposing similar figures were used to embellish Plate 23, *b*. The elements employed by the potter in working out the figures and developing the pattern as a whole were of the same simple forms found so consistently in the ornamentation of the pit-house bowls. There may be noted the parallel lines, squiggled hachure, triangles, tipped triangles, and tipped lines. The latter were probably intended to be a part of tipped triangle elements but were not completed. The use of opposed triangles to form what frequently is termed a dentate symbol, or a negative lightning pattern, is a feature which became more fully developed in later periods.

Band designs were used in a variety of ways. The elements in their composition were practically the same as many of those already noted. The chief difference to be observed is in the manner of their application to the field for decoration. Most of those in the collec-

tion from the pit houses of the Long H Ranch consist of a series of similar symbols placed around the interior walls of the bowl.

The simplest style of band design in the whole collection is one which has a series of four squiggled lines around the inside of the bowl just below the rim and three similar lines around the bottom. (Pl. 22, *b*.) At the center of the pattern, the bottom of the bowl, are two roughly circular concentric lines inclosing a dot, a variation of the "bull's-eye" symbol. This form of design unquestionably represents a survival from the Basket Maker III period as well as an adaptation of basketry ornamentation.

One of the less complicated forms of the band style of decoration is that illustrated in Plate 23, *a*. This design has two frets placed at opposite sides of the bowl. The line connecting the major parts of each symbol is so light, however, that at first glance it appears that there are four of these elements. The frets were not properly spaced and one more could have been painted to fill out the band. Instead, single line, interlocking volutes were used. Each of these volutes is crossed by a zigzag line which produces a curious effect. The decoration as a whole is one which is very characteristic of the Pueblo I period.

Another band design consists of two rows of small pendent triangles below which a single undulating or wavy line makes a circuit of the bowl. (Pl. 23, *c*.) This is a simple decoration and one which occurs quite frequently on the bowls of the period. A single row of triangular figures bordered by a number of parallel lines is common in the patterns on Pueblo I bowls.[86]

More elaborate designs of the band group are quite effective in that they suggest the plaiting of rushes or a folded ribbon. (Fig. 25.) The decoration *a* consists of a narrow band around the rim and a similar but wider one lower down on the walls of the vessel. The only elements used were solid triangular figures and parallel lines. This type of decoration occurs rather often on vessels from the early horizon at Pueblo Bonito and also is present on containers from the pit houses at Luna.[87] It seems to have been a development of the Pueblo I period. Thus far no example of it has come to light on a Basket Maker III vessel. As a matter of fact it is too elaborate a form of ornamentation for the latter. The outer portion of *b*, Figure 25, is similar to the two bands on *a*, but the former differs distinctly in the spiral symbol of squiggled line hachure which completely fills the bottom of the bowl. This portion of the decoration is suggestive of Plate 22, *c*, although in this instance the spiral is

[86] Morris, E. H., 1927, figs. 24, 32. Roberts, 1930, fig. 34.
[87] Hough, W., 1920, fig. 38.

tightly twisted. The impression that coiled basketry is suggested is even more pronounced in the case of *b*, Figure 25, than it was for the specimen previously described.

Band decorations which are like forms more prevalent in later Pueblo periods are those in which the interlocking volute is a prominent element. Two variations of such designs are illustrated by *e* and *f*, Plate 22. The first one, *e*, has six of the interlocking elements placed at intervals around the walls of the vessel. The upper side of the band has a simple bordering line but the lower is augmented by a series of pendent triangles. The design is still further embellished at the bottom by the two squiggled framing lines. The second decoration, Plate 22, *f*, has eight of the volute figures. The latter do not interlock but are continuous, although they suggest

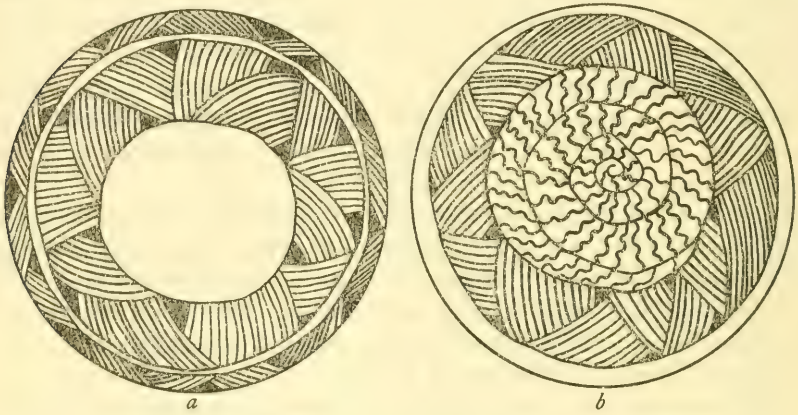


FIGURE 25.—Band designs and spiral pattern on pit-house pottery

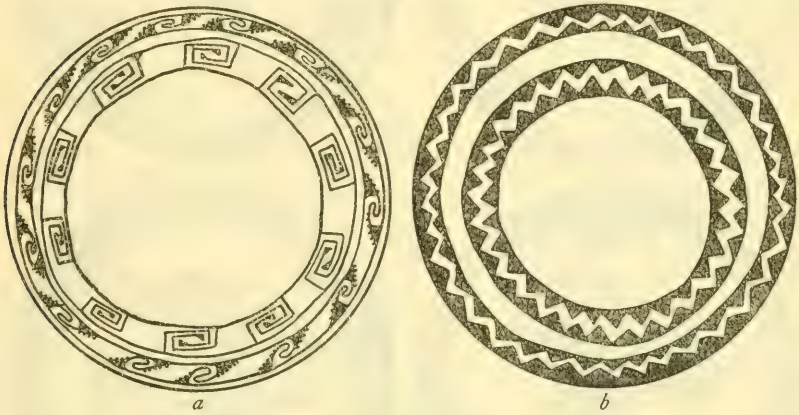
the interlocking form. These figures are bordered by single-line volutes bearing a series of ticks along one side. The lower bordering line is squiggled, as are the three bottom framing lines.

Pairs of bands consisting of rectilinear and curvilinear elements were not often combined in the same decoration. An example of such a design is illustrated by Figure 26, *a*. The upper band consists of a series of dotted, pseudo-interlocking elements suggestive of the volute, while the lower band has a number of rectilinear frets which, with one exception, actually interlock. The one different element is at the right-hand side of the drawing where the fret was made continuous. The second design in this drawing, Figure 26, *b*, is a rather common one. It has two bands of opposed triangles, the so-called dentate symbol, which produces a negative zigzag. This is frequently referred to as a lightning symbol.

One of the interesting features about the bowls from the pit-house horizon is that of the figures painted in their bottoms. Quite

a large number of the specimens illustrate this. The symbols used are quite varied in form. The simplest, and those most frequently found, are the circles. Many of the bowls merely have a single circle in the bottom, while others have two or more concentric ones (pl. 21, *c*) and others have a dot (pl. 22, *b*). The circle in the bottom undoubtedly represents a survival from the Basket Maker III period where it was a fairly common feature in the decoration.[88] The latter in its turn seems to have survived from the basket ornamentation of the Basket Maker II period. What its significance may have been is not known.

More elaborate symbols occur in the bottoms of other examples. The rectangular form was fairly popular. One good illustration of the latter is present in the bowl Plate 21, *b*. This figure consists



a *b*

FIGURE 26.—Band designs on pit-house bowls

of two rows of opposed triangles with zigzag bordering lines, both inclosed in three concentric quadrilaterals. The pattern is very suggestive of some of the Basket Maker III textile designs. In this connection it may be recalled that few textile decorations, other than those from basketry, appeared on the pottery of the Basket Maker III period. It was not until the Pueblo I potters began to seek new ways of ornamenting their vessels that they turned to the extensive sources of sandal and textile patterns for designs.[89]

Several additional forms of the rectilinear central or bottom figure are grouped in the drawing, Figure 27. The first one, *a*, is somewhat suggestive of that on *b*, Plate 21, but is not quite so elaborate. It has the three concentric rectangles, but the inner portion consists only of opposing filled corners in the innermost quadrilateral. The

[88] Morris, E. H., 1927, p. 193. Roberts, 1929, p. 119.
[89] Morris, E. H., 1927, p. 197.

filling in of the corners produced solid triangular figures which were dotted along one side. The checkerboard symbol of *b* is unique in the collection. As a matter of fact only one other vessel (fig. 24, *b*) had this element in its decoration. The symbols on *c* and *d*, Figure 27, are typical of the period and also are of the form which may be traced to sandal patterns of the Basket Maker III period. The

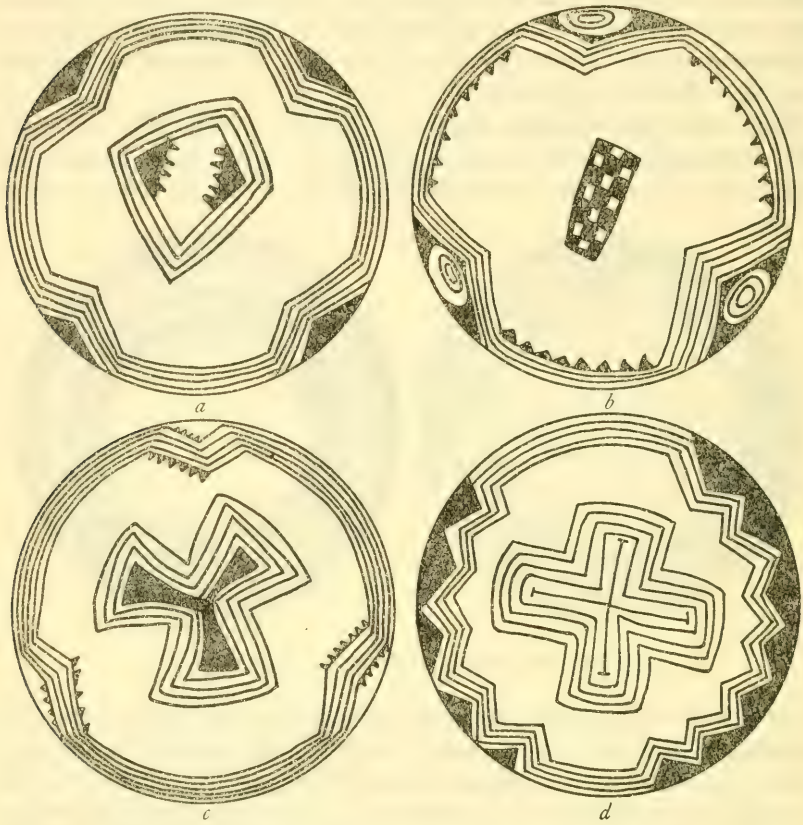


FIGURE 27.—Bowl decorations showing figures in bottoms of vessels, pit-house wares

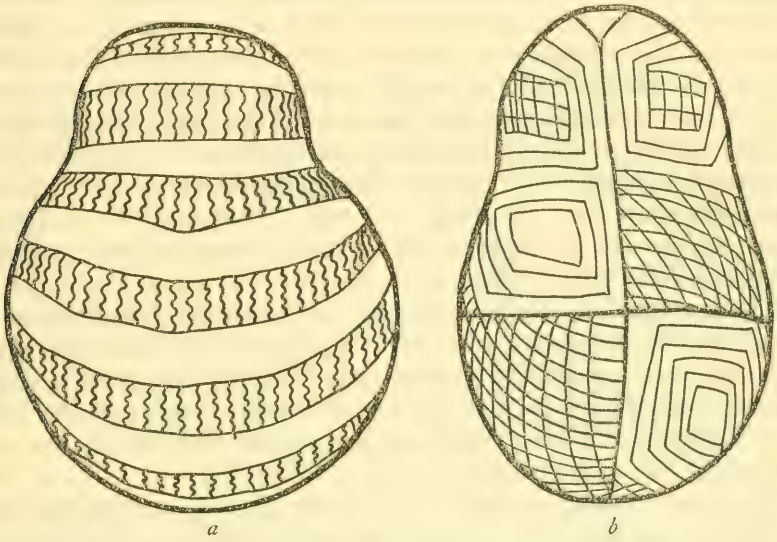
cross with parallel framing lines has been found in a number of variations,[90] but is characteristic.

The decorations on ladles were in most respects similar to those in the bowls. As a matter of fact the field for ornamentation in both groups was essentially the same. The chief difference to be observed is in the gourd-shaped dippers where the handle is a part of the bowl. On such vessels the extension of the walls which form the handle was treated as though it was a part of the bowl. Where the handle is solid and distinct from the dipper bowl the latter was

[90] Morris, E. H., 1927, fig. 23, *e*, *f*. Roberts, 1930, fig. 32, *b*.

treated purely as a bowl so far as designs were concerned. Three good examples of ladle decoration are illustrated in Plate 18.

The design on the interior surface of *a*, Plate 18, is rather unique, although common elements were used in its composition. Parallel lines, ticked lines, opposed triangles, and "bull's-eye" figures were all that were needed to make the decoration. The pattern on *b*, however, is quite like some of those in regular bowls. It is a quartered design with parallel line, squiggled line, and solid triangular elements. The simplest of all the decorations is that of *c*, Plate 18. It consists of four similar pendent figures placed at opposite sides of



a *b*

FIGURE 28.—Designs on ladles from the pit-house horizon. The squiggled hachure in *a* is very characteristic of the period

the bowl. These symbols are simple concentric triangles with a volute-like hook at the bottom. The handle is unpainted.

Two good examples of the method of ornamenting the half-gourd form of this class of vessels are shown in the drawings *a* and *b*, Figure 28. The first of these has a series of six panels of squiggled hachure. Nothing else was used. The effect produced is quite pleasing and is very characteristic of the late Pueblo I and Pueblo II periods. An almost identical specimen was found in the Chaco Canyon and quite similar ones have appeared in other sections. The second design, *b*, is unique. There is a question as to whether or not it was completed. It is possible that the latticework figures might have been intended as the base for a checkerboard pattern, which for some reason or other was not filled in. On the other hand, the potter may never have intended anything beyond what is actu-

ally present. The only elements in the whole decoration are parallel lines so grouped that they formed concentric quadrilaterals and latticework figures. These were painted in opposite sectors of the quartered bowl and in the handle.

As previously mentioned, the decorations on pit-house seed jars were predominantly of the band variety. The group of four, *a*, *b*, *c*, and *f*, in Plate 13, shows this feature in its characteristic forms. Two bands were used on *a*, Plate 13. The upper one, that around the orifice, consists of squiggled hachure, while the lower is composed of a series of solid triangles framed by single line concentric figures of the same form. The fact that they alternate, the base of one being on the lower border line, that of the next on the upper, etc., makes for a compact and pleasing pattern, one which is decidedly textile-like in its character. The second example (pl. 13, *b*) has but a single band around the upper portion of the jar. This design is similar to that found on many bowl interiors and is one which undoubtedly carried over from the Basket Maker III period. In the latter, however, it is found only on bowls. The two rows of opposed triangles separated by the series of zigzag parallel lines is typical of early black-on-white designs.

The band around the shoulder of *c*, Plate 13, is also present on many bowls—Figure 25, for example. The individual variation in this decoration consists of the series of 10 parallel line symbols which extend from the orifice of the jar to the upper border of the band. The elements of these connecting figures are lines which are half straight, half squiggled, an unusual combination.

The band around the body of *f*, Plate 13, has parallel lines and straight lines crossed by zigzag lines as its elements. The design is interesting, however, in that there is a broad zigzag of negative form running through its center. This form of decoration, in fact almost identical patterns, is also found on the bottoms of some of the pitchers. The three concentric squiggled lines around the orifice of this vessel contribute a subordinate yet typical feature in the ornamentation as a whole.

The only example of a pattern other than a band was that on *e*, Plate 13. The decoration on this vessel contains four approximately similar, although not identical, figures placed on the upper part of the jar, the zone between the shoulder and the orifice. The symbols are simple, consisting as they do of concentric quadrilaterals. On two sides of the outer rectangles there is the added embellishment of rows of solid triangles. Both the figures individually and the decoration as a whole is one which is more reminiscent of the designs of the late Basket Makers, Basket Maker III,

than are any of the other seed jars. In fact the vessel in all respects depicts an earlier phase of the Pueblo I ceramics than do the others.

Designs on canteens are quite like those on the seed jars. The main zone for decoration seems to have been around the shoulder, with the space adjacent to the orifice forming a secondary and subordinate one. The specimen illustrated in Plate 13, *d*, shows this very well. The main band has the characteristic parallel lines, solid triangles, and volute elements. The orifice is encircled by a plain ring, below which there is a second line crossed by a heavy zigzag. Fragments from other vessels belonging to this class of containers showed that this style of decoration was the prevailing one for canteens.

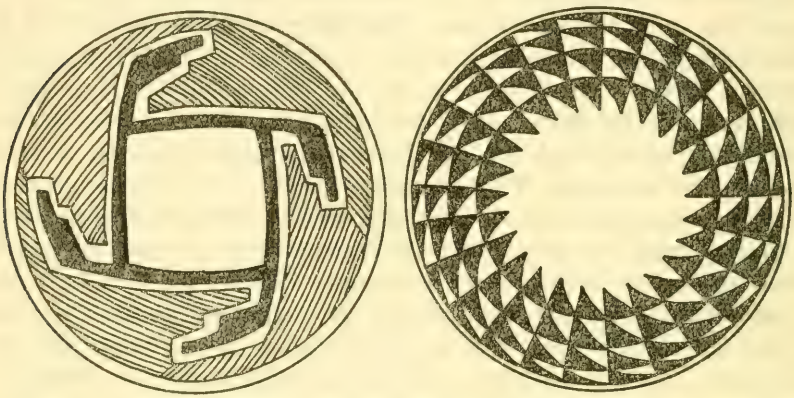
Pitcher ornamentation in the pit-house era seems to have followed the double band vogue. The three examples illustrated in Plate 15, *c*, *d*, and *e*, clearly illustrate the style. On *c* there were two different bands. The upper one, around the neck, was of squiggled hachure, while the lower one around the body was of checkerboard. The next specimen (pl. 15, *d*) also has squiggled hachure for the band around the neck. That around the body, however, is composed of four rectangles which inclose elements of straight lines crossed by zigzag ones. In two of the rectangles the latter cut diagonally across the center from corner to corner. The other two have the zigzag crossed lines running through the center parallel to the sides of the inclosing frame. The figures alternate in the band. By far the most elaborate decoration in the group is that on *e*, Plate 15. The band around the body consists of triangular and diamond-shaped figures with filled corners and squiggled lines. The portion around the neck has a series of interlocking curvilinear frets. In most cases the handles of the pitchers were left plain. When painted, the ornamentation consisted of a single line running down the center or a series of short lines placed crosswise.

The group of vessels from the Pueblo horizon is not large enough to give a broad picture of the styles in decoration, although it is sufficiently numerous to show the distinct difference between them and the pit-house forms. Characteristic bowl designs of the black-on-white wares are illustrated by the four containers pictured in Plate 23. The one lettered *f* is especially interesting because it is of a type more often found on red wares. The design on *h* is one which was highly favored by the people of this period, judging from the many fragments found bearing portions of similar decorations. It also is one which was in considerable favor in the Chaco Canyon. Unfortunately the decoration on *e* was weathered away until at the present time it is too dim to show well in a photograph. It is of

the 4-symbol, fret form. The pattern is a common one on black-on-white vessels of the Pueblo III period in the San Juan and upper Little Colorado regions.

The combination of hachure and solid elements shown by the decoration on *g*, Plate 23, is another form characteristic of the Pueblo III period. It occurs in the Chaco Canyon, on the Mesa Verde, along the upper Little Colorado, and is found in the upper Gila and Rio Grande districts. The vessel here illustrated is very suggestive of some of the upper Gila styles.

The design *a*, Figure 29, is one which is very common in the San Juan area. It is prominent on bowls from the Chaco Canyon, from Aztec, and even from as far north as the Mesa Verde. Many frag-



a *b*

FIGURE 29.—Bowl decorations from the pueblo

ments from vessels bearing this type of ornamentation were found in the pueblo. Quite similar combinations of solid and hachure figures were found in the stone kivas at Hawikuh, about 25 miles (40.234 k.) northeast of the Long H Ranch, although the latter, like many of those from the Long H ruin, have more the feeling of the upper Gila style than they do of the Chaco Canyon form.[91] The other design, Figure 29, *b*, was also fairly frequently used if the potsherds are any criterion. This form of decoration appears quite regularly on the black-on-white bowls in the San Juan wares and may be observed on vessels from the ruins of the upper Little Colorado, particularly the district east of Zuñi in western New Mexico.

Bowls of the black-on-red group generally bore decorations of the contrasting solid and hachure elements. This feature is rather characteristic of the pottery of this group in the early Pueblo III period. No whole specimen was obtained, however, and a complete design

[91] Hodge, F. W., 1923, pl. xx.

can not be illustrated. The only bowl of this class which was found almost intact is that illustrated in Plate 16, *b*. This design differs from the general run in that it consists of a band composed of a series of seven pointed stars or flowers running around the walls of the bowl. A larger symbol of the same form was painted in the bottom. Variations of this pattern are not uncommon, but they are not as prevalent as the combination of hachured and solid elements.

Since no complete specimen of a ladle was obtained from this horizon, little can be said regarding the ornamentation of this group of vessels. The potsherds indicate, however, that the bowl portions were treated just like ordinary bowls and had the same sort of designs painted on their inner surfaces. The handles were attached and, if painted at all, had designs independent of those in the bowls. Handle decorations consisted largely of a series of oblique lines across the top, a long line running lengthwise along the center of the upper surface, or frequently were just a row of dots.

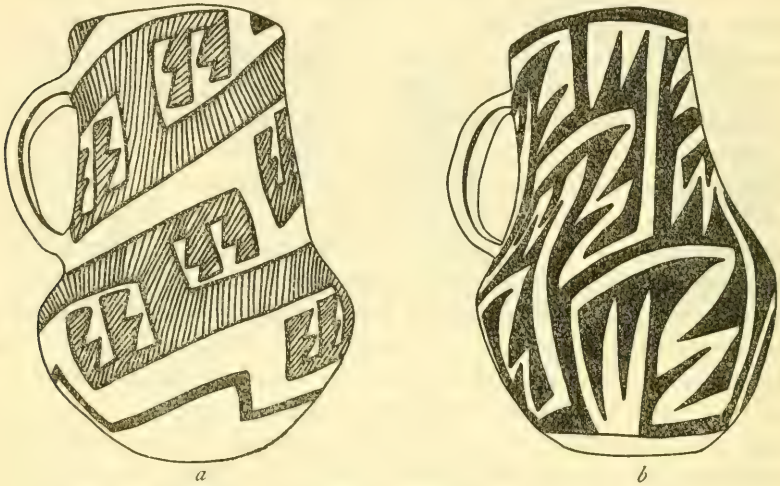
There were no seed jars in the Pueblo group. The lack, even, of fragments from such vessels is puzzling because they are present in collections from other ruins of this type in the region. Their apparent absence is probably not to be attributed as much to the fact that the people did not have them as to the possibility that potsherds from them were simply not obtained in the digging.

Only one complete canteen was found, although occasional fragments from similar objects were found. The design on this specimen shows very clearly in the photograph, Plate 14, *c*. The combination of straight and curved lines in the design is somewhat suggestive of the treatment on some of the red wares. Taken as a whole the decoration is a very good example of the interlocking fret style of ornamentation. The frets pendent from the line around the neck are comparatively simple. The opposing and interlocking symbols are more complex and extend down to the lower portion of the body, where they interlock with frets rising from a line around the bottom. There are three main figures or three parts to this design. The all-over character which it exhibits is in decided contrast to the band style of ornamentation on the pit-house canteens. Fragments from additional pueblo containers of this type indicate that the all-over pattern was predominant in that period.

Pitchers in the black-on-white wares from the Pueblo horizon also tend to the all-over style of decoration, although there is an occasional exception. A good example of the all-over form is shown in Plate 14, *a*, where checkerboard symbols and straight-line hachure were combined to make a pattern which covers the vessel from the rim to the bottom. The second one on the same plate, *b*, is different from the general type in that two distinct zones were used. The

major portion of the design is on the body, covering the portion from the shoulder to the bottom. It is composed of continuous fret and latticework elements. The minor part of the ornamentation consists of a series of triangles pendent from the rim. Additional characteristic all-over patterns are illustrated in Figure 30, *a* and *b*. Both in shape and decoration these two pitchers are very suggestive of Chaco Canyon vessels. As a matter of fact almost identical designs can be found on vessels which came from that region.

The handles on black-on-white pitchers are practically always painted. The ornamentation is rarely elaborate. It generally consists of one or several broad, heavy lines running from top to bottom, parallel to the sides. Occasionally the decoration may consist en-



a *b*

FIGURE 30.—Styles of pitcher ornamentation in pueblo horizon

tirely of a series of dots, or now and then one will bear a broad zigzag line down the center. On a few some form of the checkerboard motif was employed. Rarely was the entire handle left without a decoration.

Only one pitcher belonging to the black-on-red group was secured. Its decoration seems to be typical for vessels of this kind in the region.[92] Contrasting solid and straight line hachured symbols form the design around the neck. (Pl. 16, *a*.) The body is surrounded by a band composed of elements in which both straight and curved lines were used. The figures are interlocking. Potsherds from other black-on-red pitchers show that in practically all cases contrasting hachured and solid figures were the main elements in the designs.

[92] Hough, W., 1903, pl. 36, No. 212508.

One exception had a checkerboard pattern. There was so little evidence of handle decoration that it is not possible to discuss that feature.

ADDITIONAL POTTERY OBJECTS

Among the fired clay specimens obtained from the excavations are a number which can not be considered as belonging to the group of vessels discussed in preceding pages. They are closely associated with the latter, however, in that they were made from fragments of broken containers. This group consists of the scrapers used in smoothing down clay vessels during the process of their manufacture (pl. 24) and round clay disks, with and without perforations. There is some question regarding the latter. Some believe that those with the perforations were buttons which were placed on the shafts of spindles to keep the thread from slipping off. Others are convinced that they were true whorls to assist, acting in the capacity of small fly wheels, the whirling of the spindle. Those without the hole in the center are usually considered to have been some form of counter, although it is quite possible that they may simply be unfinished whorls.

All of these forms were found in both horizons, the only difference to be observed being that of the potsherds from which they were made. The latter generally were characteristic of the vessels of the period. A few made from pit-house fragments were found in the material from the pueblo ruin, as might be expected, since there were potsherds from the older period lying about. Not a single one of the objects from the pit houses, on the other hand, had been fashioned from other than pit-house pieces. This is according to what should be if the pueblo was of later date.

The series of scrapers in Plate 24 came from one of the pit houses and is of interest because it shows definitely that such implements were employed in the ceramic industry at a fairly early period in its development. Thus far they have been found only as far back as the Pueblo I period. None have come from a Basket Maker III site.

Among the fired clay objects frequently found in ruins are pipes of the tubular or conical variety often called cloud-blowers. The latter name is due to the use of similar objects by some of the modern pueblos in certain ceremonies where puffs of smoke are blown toward the cardinal points from such pipes. The smoke in such instances is considered emblematic of rain clouds and for that reason the term cloud-blower has become attached to that particular style of pipe. The Long H sites yielded only one fragment from such an object. The single piece came from the pit-house level and is quite

similar to the usual forms. All of the remaining pipes in the collection are of stone and will be discussed in connection with the stone artifacts. The fact that only a part of one clay cloud-blower was secured while many stone ones were found shows a marked contrast between this region and those to the north, where the reverse is generally the case. As far as pipes are concerned the situation indicated is that of a southern and western, rather than a northern, influence.

Basketry

A few charred fragments of basketry show that the inhabitants of the pit houses, and also those who dwelt in the pueblo, had containers of woven materials. The actual type of weaving can be determined from the small bits, but nothing can be learned of the size or shape of the baskets from which they came. There is no marked difference between the pieces from the pit-house horizon and those from the pueblo. Both had double rod foundations. The fine, pliable strands used in the stitching were woven in and out around these rods which were placed side by side without any additional padding or bundle. The fine strands were carried over, under, and through, and up to the next pair of rods, where the same order was repeated.

The stitching in the pit-house specimens shows that the work was carefully done and the passing over, under, and through of the strands is quite regular. The pueblo examples are much finer in this respect. The size and evenness of the stitch in the latter is equal to that in the choicest specimens from the Southwest. It is in this feature that there is a noticeable difference between the two horizons.

Charring of the baskets by the fire which destroyed the houses or portions of the pueblo in which they were found preserved parts of them, but also make it practically impossible to tell what materials were used in their manufacture. The rods appear to be very small willows. Of this there can be no certainty, however. The fibers used in the stitching may be some form of rush from the region, but this too is questionable. All that can be stated definitely is that the baskets were of the parallel rod type and that the weaving of the pueblo group was much finer than that of the people of the pit houses.

Bonework

The bonework secured from the excavations does not exhibit a great diversity of forms or of kinds of material employed in the manufacture of the objects. The majority of the specimens are implements,

awls especially, and the animal most frequently represented by the bones is a deer. There are certain distinctions to be made in the tools. Some were shaped from pieces intentionally cut for the purpose, others were fashioned from fortuitous splinters, while still others were made with very little modification of the original bone. There are some differences between the implements from the pit houses and those from the pueblo. This is particularly marked in the group of awls made from intentionally prepared bones. In addition, certain forms are present in the pueblo group which are not to be observed in the pit-house series. On the other hand, the pit-house dwellers seem to have had some forms which did not survive to later pueblo times.

The characteristic awl of the pit-house horizon was a short, stubby one made from the cannon bone of the deer. (Pl. 25.) The material was definitely prepared for the purpose in that the bone was first split down the center and then cut and rubbed to the desired length and sharpness of point. Awls of this particular form are typical of the early periods. They are found in abundance in both Basket Maker III and Pueblo I sites. Occasionally the type is secured from ruins of later date, but in such cases they represent only a minor form and not the common variety.

Examples of awls belonging to the pit-house group of implements made from fortuitous splinters are illustrated in Plate 26. For tools of this nature any chance piece of bone would suffice. All that was needed to make a serviceable implement was to point one end. Rarely did such objects receive any additional shaping or rubbing. Constant use would tend to impart a certain amount of polish to the point end, but nothing more. Only one awl (pl. 26, *c*) in the group illustrated shows additional rubbing. This particular implement was smoothed along the sides. All of these tools were made from fragments of deer bone, mostly pieces from the long bones.

Tools made by the pit-house people with only slight modification of the original bone are of the forms shown by the specimens in Plate 27. The two upper awls, *a* and *b*, are fragments from long bones, the tibia and femur, of small mammals, probably rabbit. The shaft was simply cut or broken into two pieces and one end sharpened. Nothing else was done to make the implement. The object *c* was made from the ulna of a deer. All that was needed to make a serviceable implement was to rub down one end to a point. The remainder of the bone in its natural state furnishes a good handle. The fragment *d* is rather curious. The socket or articular portion was broken out of the scapula or shoulder blade of a deer and a rather blunt point worked at one end or side, the upper in the photograph. There is nothing to indicate what the purpose of this object may have been. It distinctly shows wear from use, however.

Among the pit-house awls are a number which are comparatively long and slender. Two variations of this form are shown in Plate 28, *a* and *b*. There was not a great deal of modification of the original bone employed in the manufacture of *a*, although the tool would indicate that the material was intentionally cut to be used in such a capacity. This was not true for *b*, however. The latter was worked down to a considerable degree and there was a marked modification of the form of the original bone.

One group of implements which was found only in the pit-house horizon consists of long, flat bones, well polished, with broad, blunt spatulate edges at one end and perforations in the other. Tools of this type are usually called bodkins. (Pl. 28, *c-f*.) These seem generally to have been made from rib fragments. They would have been very serviceable in some kinds of weaving or in threading cords through various forms of textiles. There were no true needles, only the blunt-ended objects illustrated. It seems rather curious that this form apparently did not survive in the pueblo.

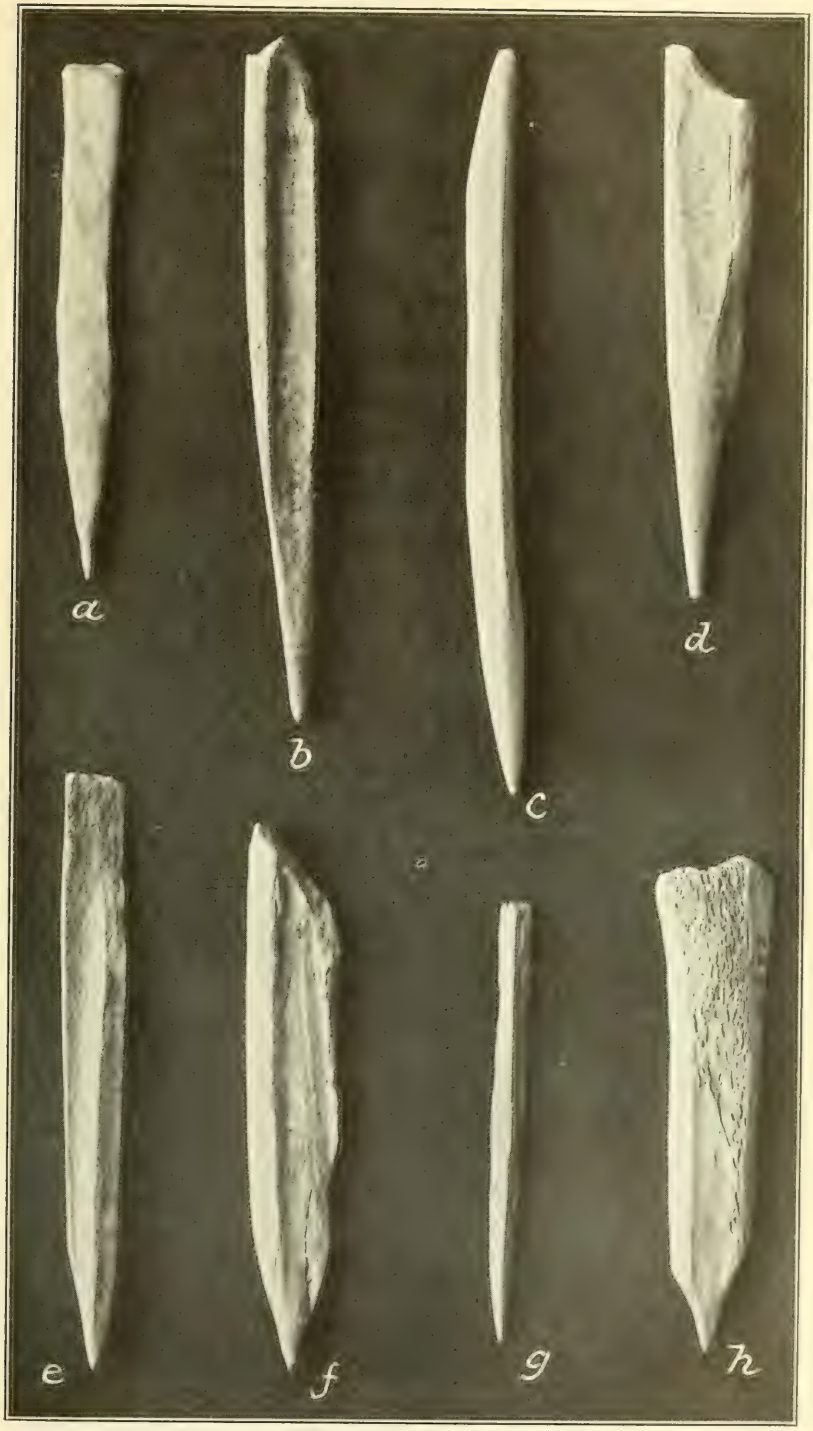
The awl of the pueblo period which was made from the cannon bone of the deer is in distinct contrast to that of the pit-house horizon. While the latter is short and stubby, the former is long and tapering. (Pl. 29.) This distinction is not one which is applicable solely to conditions at the Long H Ranch, but seems to be a period characteristic in general. The group illustrated in Plate 29 came from the same location, a burial. There were many fragments from similar implements in the house refuse, however, and there is no question but what they are typical of the horizon. Four of the specimens are awls. The fifth, *c*, however, is a form of implement frequently termed a spatulate awl. The worked end is not sharpened to a good point; rather is it squared in the form of a spatula.

There is very little difference between the awls of the fortuitous splinter group in the pueblo series and those from the pit houses. (Pl. 30.) As a matter of fact if careful record of the provenience of the objects had not been kept it would be quite difficult to tell which culture was represented. The chief distinction seems to be that on the whole the pueblo peoples used smaller bones and were a little more prone to rub down rough edges. Also, there are more bones from small animals, the rabbit particularly.

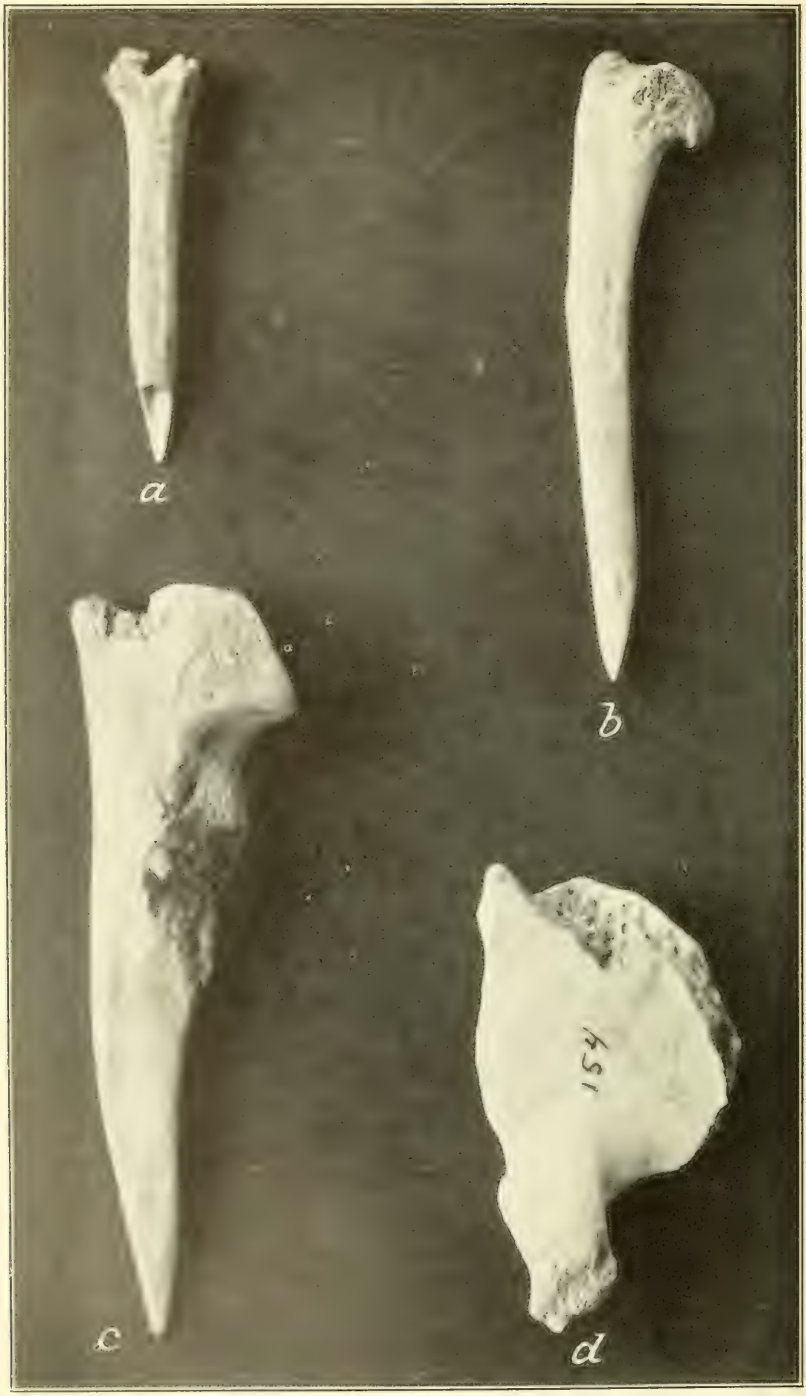
The specimens from the pueblo contain several implements not found in the pit houses. The scrapers or fleshers made from long bones of the deer (pl. 31, *a* and *b*) belong in this category. This form of tool is one which is characteristic of the Pueblo III period. They also are considered typical of the San Juan area. Evidence

POTTERY SMOOTHERS MADE FROM VESSEL FRAGMENTS

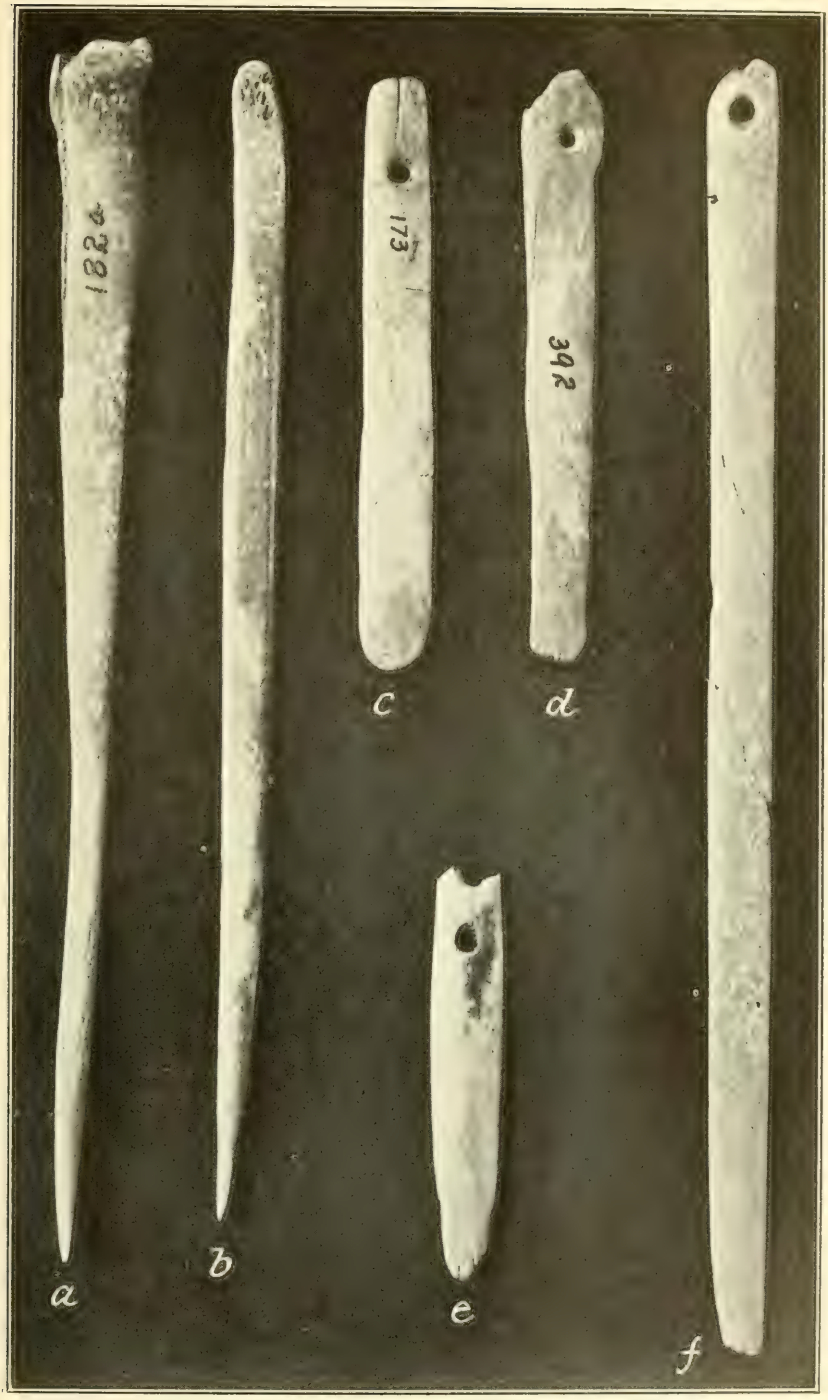
BONE AWLS, CHARACTERISTIC PIT-HOUSE FORM



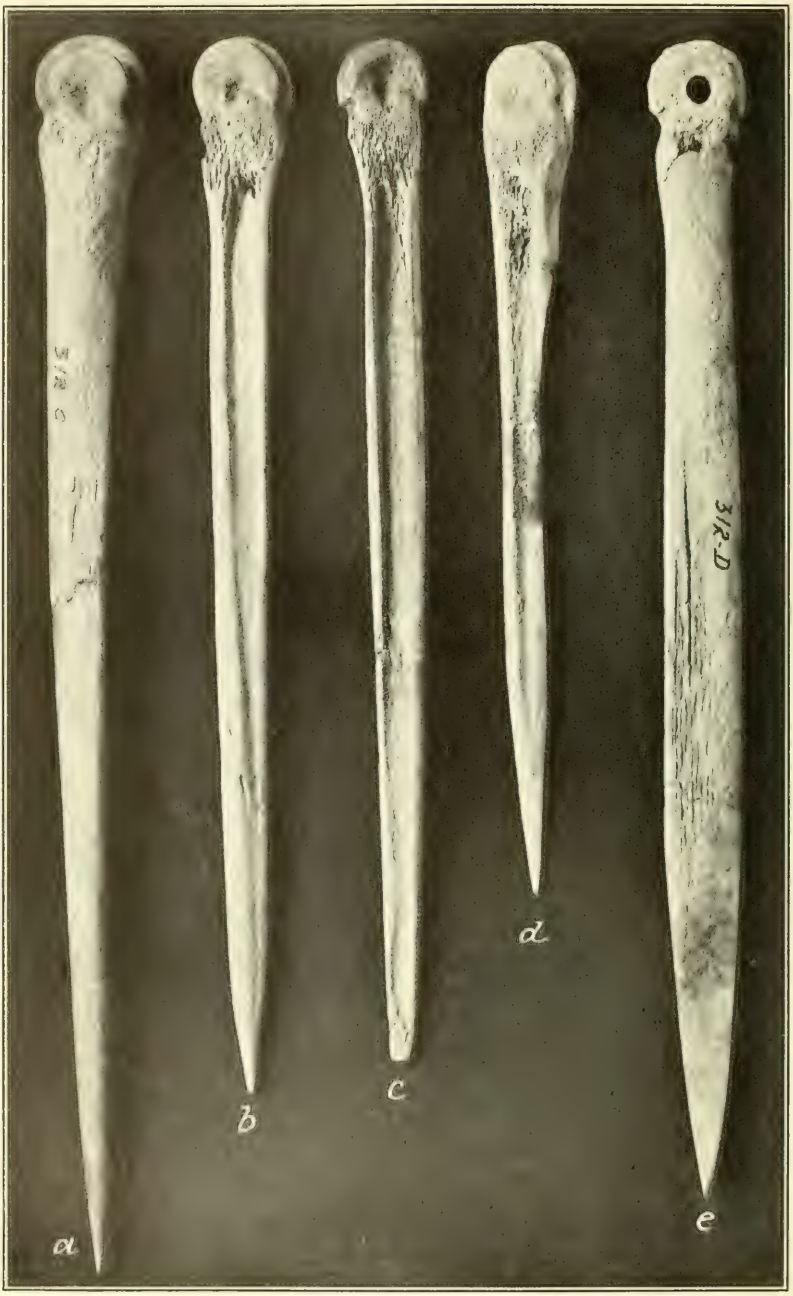
AWLS MADE FROM FORTUITOUS SPLINTERS, PIT-HOUSE IMPLEMENTS



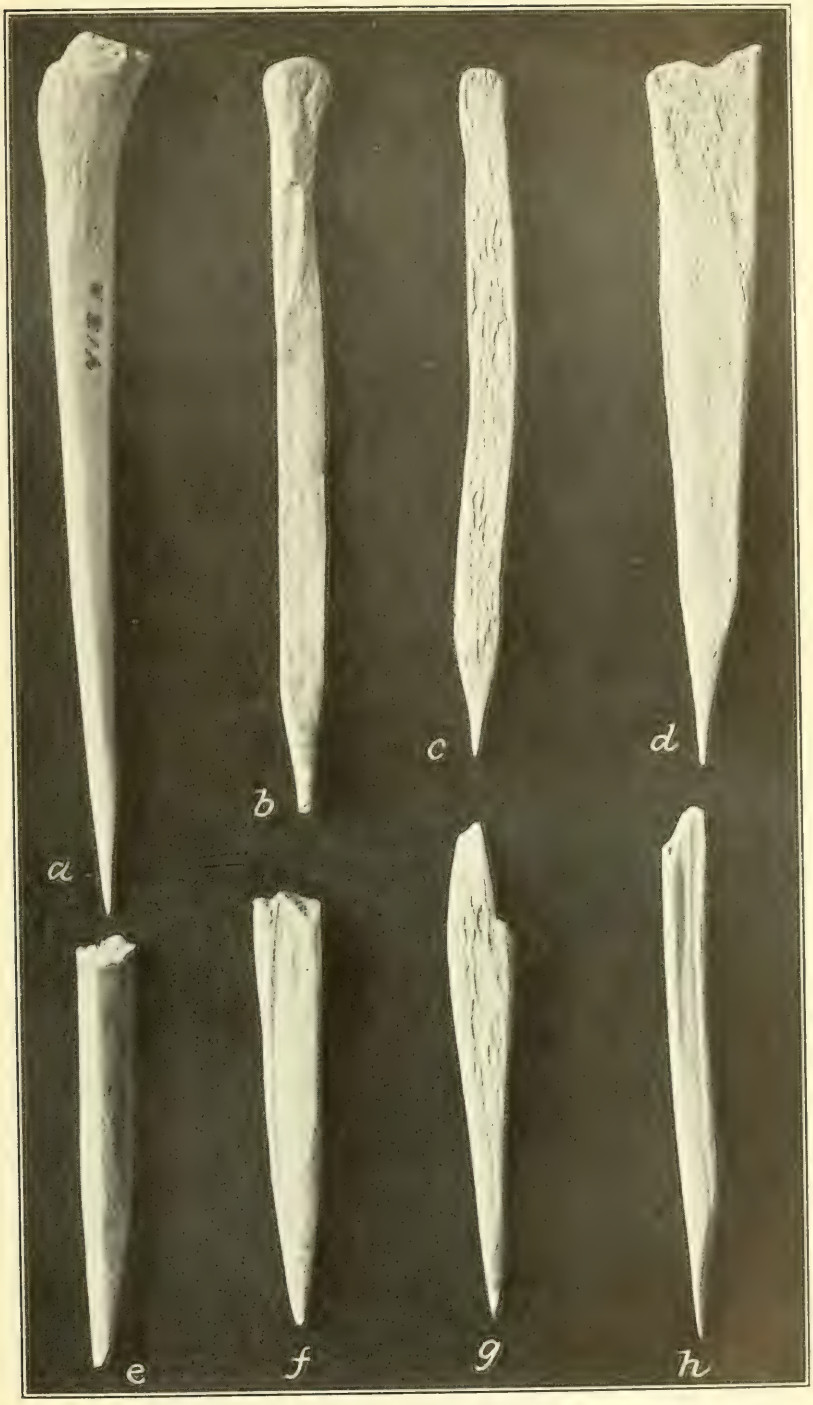
PIT-HOUSE TOOLS SHOWING ONLY SLIGHT MODIFICATIONS OF THE ORIGINAL BONE



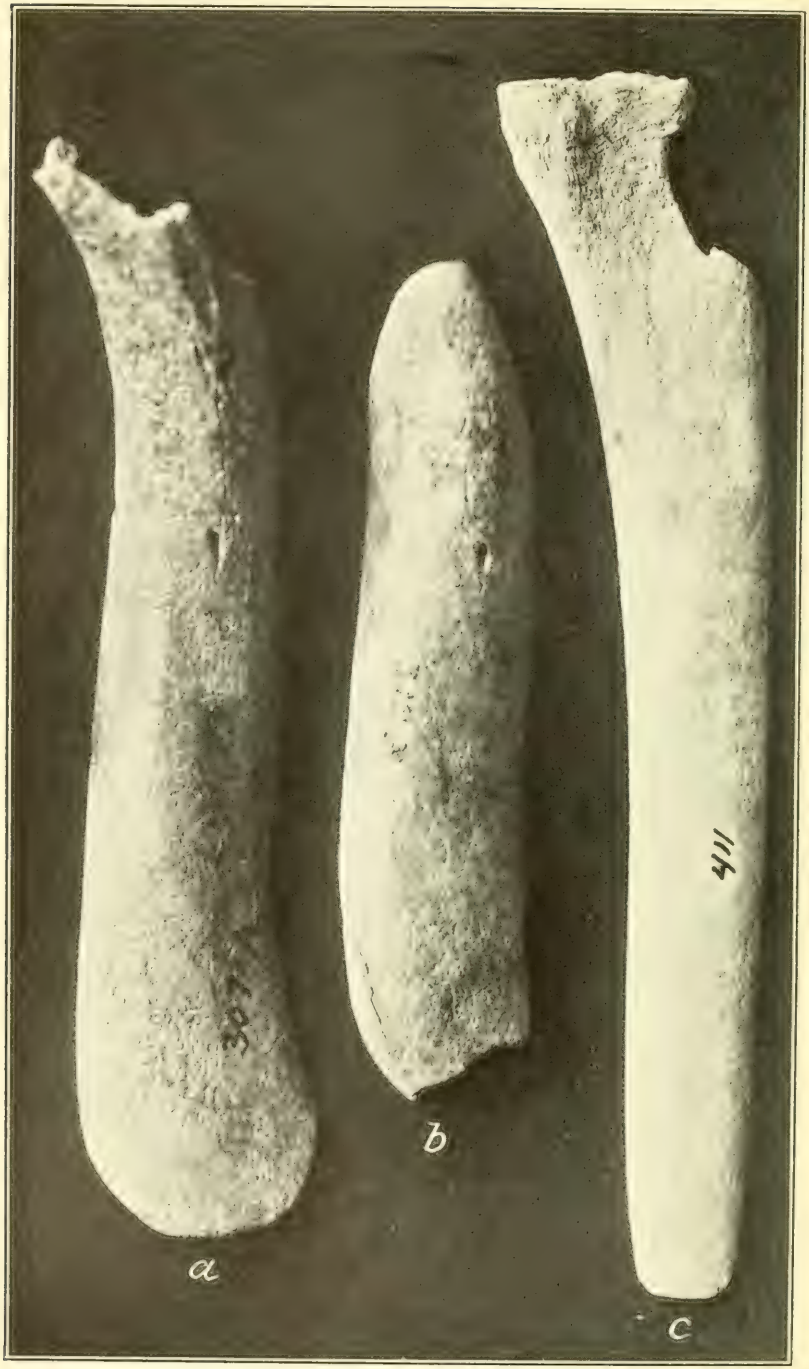
SLENDER AWLS AND BODKINS FROM THE PIT DWELLINGS



BONE AWLS AND SPATULATE IMPLEMENT FROM THE PUEBLO



PUEBLO AWLS MADE FROM FORTUITOUS SPLINTERS



BONE SCRAPERS FROM THE PUEBLO

thus far would indicate that they are not a Little Colorado form of tool and also that they do not belong in the regions farther south and west. Their presence in the Long H Ranch collection may be considered as another indication of northern influence, possibly northern affiliations, or perhaps only trade relations. The third implement in this group (pl. 31, *c*) is another style of scraper which probably was used in skinning animals and dressing the pelts. At least such a tool could be used to advantage for such purposes. It is a form which apparently is more or less common in the upper Little Colorado region, as a number of examples have been observed in collections made from ruins comparable in age to the one under consideration. This kind of an implement is also missing from the pit-house series.

The ornaments made from bone were not plentiful. Only two forms are represented in the collections from both horizons. The most numerous is that of the bone tubes generally referred to as bone beads. These were made from the shafts of long bones of birds, usually turkey, and small mammals. The method of manufacture was simple. The joints or condyles were cut off and the remaining tube polished. Only a few of these came from the pit houses. The bulk were in the pueblo horizon.

The second form of bone ornament was that of the finger rings. These came only from the pueblo. No whole specimen was obtained and only fragments from a few objects are in the collection. Bone rings are not unusual in the Pueblo III horizon. Various large ruins in the Southwest have furnished examples. None of those from the Long H ruin gave any indication of inlay work or additional embellishment such as that exhibited by some of the specimens found in the Chaco Canyon. They seem to have been simple bone rings.

Stone Objects

The objects fashioned from stone which the prehistoric dwellers on the Long H Ranch used in their daily life comprise a number of different forms and illustrate two methods of manufacture. The list includes metates or milling stones and the hand stones or manos used with them; axheads; mauls; bowls; paint dishes; slate tablets; drills, for making perforations in beads and other objects; knife blades; spearheads and arrowheads; pipes; and ornaments. As in the case of other groups of objects, there are some differences to be observed between the pit-house and pueblo forms. The two forms of manufacture represented are the pecking and grinding and the chipping or flaking.

Metates or milling stones on which the corn was ground are of the open end, grooved type. (Pl. 32.) In practically all cases these stones have a small projection at one end which served as a rest for the hand stone used in the grinding process. On most of the metates this projection has a slightly concave upper surface. This feature is quite suggestive of the so-called Utah-type metates, although the latter have a more pronounced depression. The latter frequently is distinctly a shallow box with definite sides. None of the examples in the present collection are as elaborate as the Utah forms, but they do suggest that possibility. Perhaps they represent the prototype of the fully developed form. As far as could be determined the same type of metate was used in both the pithouse and pueblo horizons. A large number were found in the former and although only a few were obtained from the latter they were of the same general type.

Materials used in the metates were lava rock and sandstone. Those made from lava, such as the example pictured, were present in larger numbers than were the sandstone slabs. One explanation for this condition is that the lava rock could more easily be obtained. There is an outcropping of this material only a few miles from the ruin sites, while the sandstone, as in the case of that used in the walls of the pueblo, would have had to be carried from a much greater distance. The lava blocks no doubt made very suitable stones for grinding, despite their porous nature. The deeper, larger holes would soon become filled with meal and the surface rather well adapted for grinding. Even at the present time many of the modern Pueblos seem to prefer the lava form of metate and it is quite common among certain classes of the Mexican people.

These metates were not enclosed in bins, such as are found in many Pueblo III and later structures, but were mounted on small stones above the floor. An example of this placing of the metate was cited in the discussion of one of the pit houses and one of the illustrations (pl. 5, *a*) shows one in position. Although none of those found in the pueblo were so placed, the fact that no mealing bins were present would suggest that the stones probably were used in the same fashion as those in the older houses.

The metates did not vary greatly in size. There was, of course, some difference from stone to stone, but in general they were fairly consistent. The example illustrated measures 1 foot 10 inches (55.88 cm.) in length. The end where the groove or trough opens is 1 foot (30.48 cm.) wide and the top or end with the rest for the hand stone is 8 inches (20.32 cm.) wide. The trough has a total length of 1 foot 1 inch (33.02 cm.), with a width of 8 inches (20.32 cm.).

Its average depth is 1 inch (2.54 cm.). The stone itself has an average thickness of 3½ inches (8.89 cm.).

The hand stones or manos used with these metates were all of the single-hand, oval form. (Pl. 35, *d*.) The bottom side of the specimens recovered is flat while the top is rounding or convex. The stones are slightly shorter than the width of the trough in which they were used. Their width is usually about half their length. Their thickness varies but in no case measures more than 1½ inches (3.81 cm.). As in the case of the metates, the stone used in their manufacture was either lava rock or sandstone. Indications were that in general the kind of metate determined the kind of mano. Lava was used on lava and sandstone on sandstone.

For making both metates and manos the pecking and grinding method was used. The stones were pecked into their approximate shape and then the rough spots were ground down by rubbing with another stone. Beyond working out the groove and roughly shaping the metates little was done to the stone used in making them. In this connection a slight difference was observed between those from the pit houses and the pueblo. The latter seem generally to have been given a little more finish. The smooth surface on the under side of the manos is to be attributed, for the most part, to the wear from use. It might be mentioned in passing that the depth of the metate grooves is not so much the result of the rubbing back and forth of the mano as it is the pecking of the surface so that grinding would be facilitated.

Mauls from the sites are of two forms. One is quite cylindrical and the groove for hafting completely encircles the stone. (Pl. 33, *d*.) The other type is more oval and the groove occurs only on three sides. (Pl. 33, *c*.) The cylindrical form always has rounded ends, while the oval type tends to somewhat flattened striking surfaces which taper from the groove toward the ends. The cylindrical type is old. It is the form consistently found in Basket Maker III and Pueblo I sites in the San Juan area and has a wide distribution in other sections. The second form seems to be an early pueblo development in the Little Colorado region. Hough found similar ones in his explorations [93] and private collections from the area contain other examples. The cylindrical form seems to have been discontinued at this location before the pueblo was built. The second type is associated with the remains of both periods. Materials used in making mauls were lava, sandstone, and diorite.

Two forms of axheads were found. One has a short bit (pl. 33, *a* and *e*), while the other has a long cutting edge (pl. 33, *b* and *f*). Both forms were secured from the pit houses but only the short-

[93] Hough, W., 1903, pl. 14.

bitted type was present in the pueblo. The short, stubby specimens in many instances seemed to be intrusive in the pit-house débris. This could not be established with certainty, however, and as a consequence it has been deemed proper to place them in both horizons. The short-bitted axhead is one which is typical of the Little Colorado region, judging from the specimens in collections attributed to that area. The longer forms are comparatively scarce in the same series and since the collections came from sites which are subsequent to the pit-house horizon the long-bitted axheads would appear to be typical of the older horizon.

All of the axheads are grooved. On some the groove completely encircles the stone, while on others it is found only on three sides. There are more with the 3-sided groove in the short-bitted group than in the long forms. Another feature which is peculiar to the short forms is that the groove appears to be bordered by a ridge. This effect is the result of grinding away part of the surface, toward the cutting edge, in such a fashion that the ridge was left. All of the specimens were shaped by the pecking and grinding method. The chipped edge of *b*, Plate 33, may be attributed to an accident after the implement was made and not to an intentional flaking to produce a cutting edge. Materials used for making axheads were diorite and an occasional granite bowlder. Sandstone was too soft to hold the necessary edge for implements of this nature.

One of the most interesting of the groups of stone objects is that of the stone bowls. (Pl. 34.) These range from rather crudely finished specimens to finely executed objects such as *c* and *d*. All of the examples were found in the pit houses. No indications of this form of stonework were present in the pueblo. This seems rather strange in view of the fact that in the region to the south they occur in horizons comparable to that of the communal dwelling. Hough found a number of examples along the upper Gila [94] and they are known from sites farther downstream, as well as from the Mimbres area to the east. They certainly indicate southern contacts in this case, but why they should occur only in the older horizon is not apparent. Their positions in the pit houses were such that they could not be judged intrusions from the latter period. They unquestionably belonged to the pit-house era. Perhaps when additional work is done in the regions to the south information will become available which will throw some light on the subject.

None of the bowls are of such a nature that they could be deemed mortars such as Hough found.[95] What their function could have been is not known. All were made by the pecking and grinding

[94] Hough, W., 1914, figs. 12, 13, 14; p. 16.
[95] Hough, W., 1914, fig. 49.

method. The bowl was first roughly blocked out by pecking with another stone. The surfaces were then rubbed or ground until fairly smooth. Lava, red and gray sandstone, and granite bowlders were the materials used for these objects.

A part of a curious object fashioned from stone, mentioned previously, was found in the sipapu of one of the pit houses. (Pl. 35, *b*.) One end had been broken off, presumably as a result of the fire which destroyed the house in which it was found, and the total length could not be determined. The object is cylindrical in shape. The unbroken end is somewhat battered and chipped, which suggests that it possibly might have had slight use as a pestle. There were no traces of mortars, however, in which it might have been employed. It is more likely that the small amount of flaking was a result of the process of the original shaping of the object. As suggested in an earlier paragraph, it might have had some ceremonial significance. Some of the Zuñi workmen called it a kiva stone, but it is not of the shape or nature of such objects. Its presence in the sipapu may have been purely accidental, although indications were that it had intentionally been placed in the hole in the floor. The most that can be said is that it is an object of unknown use. It was ground and rubbed down from a piece of shale.

One of the burials belonging to the pueblo horizon was accompanied, in addition to the other mortuary objects, by a well-worked slab of slate. (Pl. 35, *a*.) What the purpose of this specimen had been could not be determined. It is not of the proper shape to be classed as a sandal last. Stone slabs are found rather frequently in the Little Colorado region and also along the upper Gila.[93] They are both simple and carved in elaborate fashion. Some of those found by Hough are painted. If the one from the burial at the Long H Ranch had been painted all signs of the pigment had disappeared before it was recovered.

A small piece of sandstone which had been worked to form a palette used in the preparation of paint came from the pit-house level. The upper surface of this stone has a shallow concavity, there are small grooves around the corners, and there is a groove completely encircling it around the sides, or perhaps better the edges. (Pl. 35, *c*.) This was the only palette found. In many respects it suggests somewhat similar objects which have been found in the upper Gila region and also in the Mimbres section of southwestern New Mexico.

The chipped implements comprise several groups, including drills, knife blades, spear points, and arrowheads. The materials used in

[93] Fewkes, J. W., 1904, p. 104. Hough, W., 1914, p. 31.

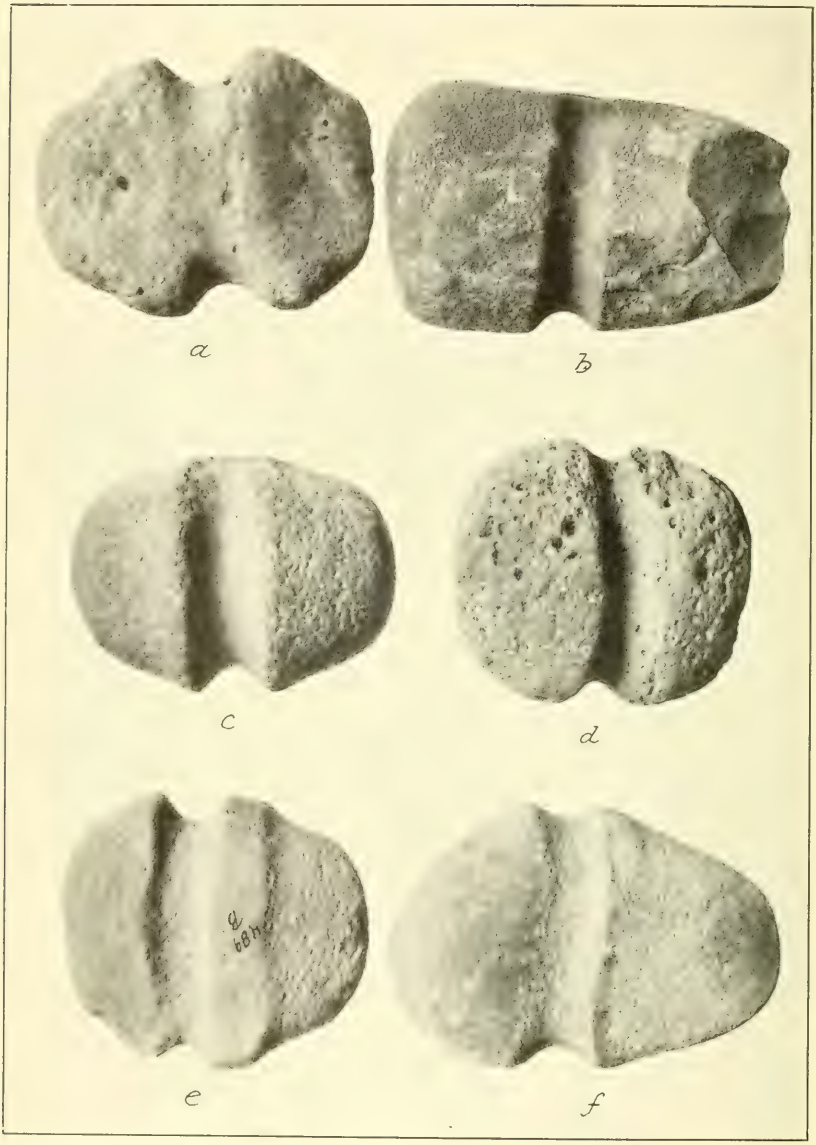
these objects were mainly obsidian, chert and chalcedony. Most of them are of the latter substance. There is a plentiful supply of it in the region—in fact there are great stretches where the ground is literally covered with brightly colored flakes of it.

Drills and knife blades from the pit-house horizon are illustrated in Plate 36. Typical examples of the style of drill employed are shown by *a* and *b*. That there were variations in the forms of knife blades is clearly evidenced by the specimens *c* to *f*. The short, stubby type of blade, *c*, is not at all uncommon, and *e* and *f* also are frequently found. The latter are often classed as spear points, but hafted specimens from widely scattered sites have rather conclusively shown that the broad blade is the typical form used in knives, while the spear points are usually more slender.

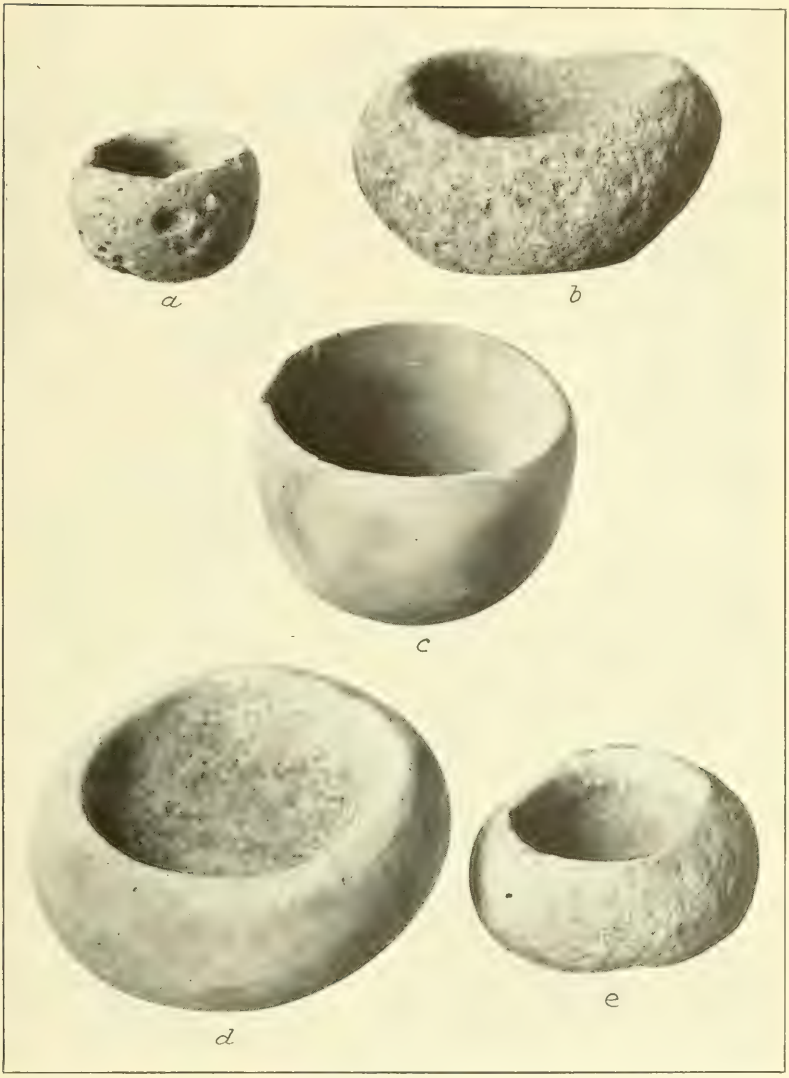
Cutting edges from the pueblo are not numerous and in many cases are represented only by fragments. (Pl. 37.) Several forms seem to have been made. The type frequently confused with spear points is represented by *a* and *c*, Plate 37. Unhafted chips of scraper form with well-chipped edges were found. (Pl. 37, *b*.) For some unknown reason no examples of this class were obtained from the pit houses. As a general thing they are more numerous in earlier horizons than any other variety. The pueblo stone workers seem, also, to have made long, finely chipped blades with comparatively straight parallel edges. No whole specimen was secured and this phase of their craftsmanship is represented only by fragments, of which Plate 37, *d*, is an example.

A characteristic group of spear points from the pit-house horizon is shown in Plate 38. Most of the examples have tangs and notches, although an occasional specimen, such as *e*, does not. Practically all of the tanged forms have the notches set at right angles to the long line of the object. No example with the notches set at an angle and down-raking barbs was observed. As a matter of fact, the latter features are more consistently present on knife blades in the group of large specimens. No spear points were found in the pueblo. This is consistent with the tendency of the period, Pueblo III, throughout the Southwest. As the pueblo cultures progressed there seems to have been a decrease in the use of spear points and a corresponding increase in that of arrowheads. It will be recalled that the early and classic period Basket Makers, I and II, had only the spear and spear thrower and that the bow and arrow apparently did not make its appearance until late in Basket Maker III. The latter ultimately replaced the other weapon entirely. Hence, in later pueblo periods spear points were not so extensively used. There is no evidence thus far to show it, but it is possible that the spear of later periods was of the thrusting rather

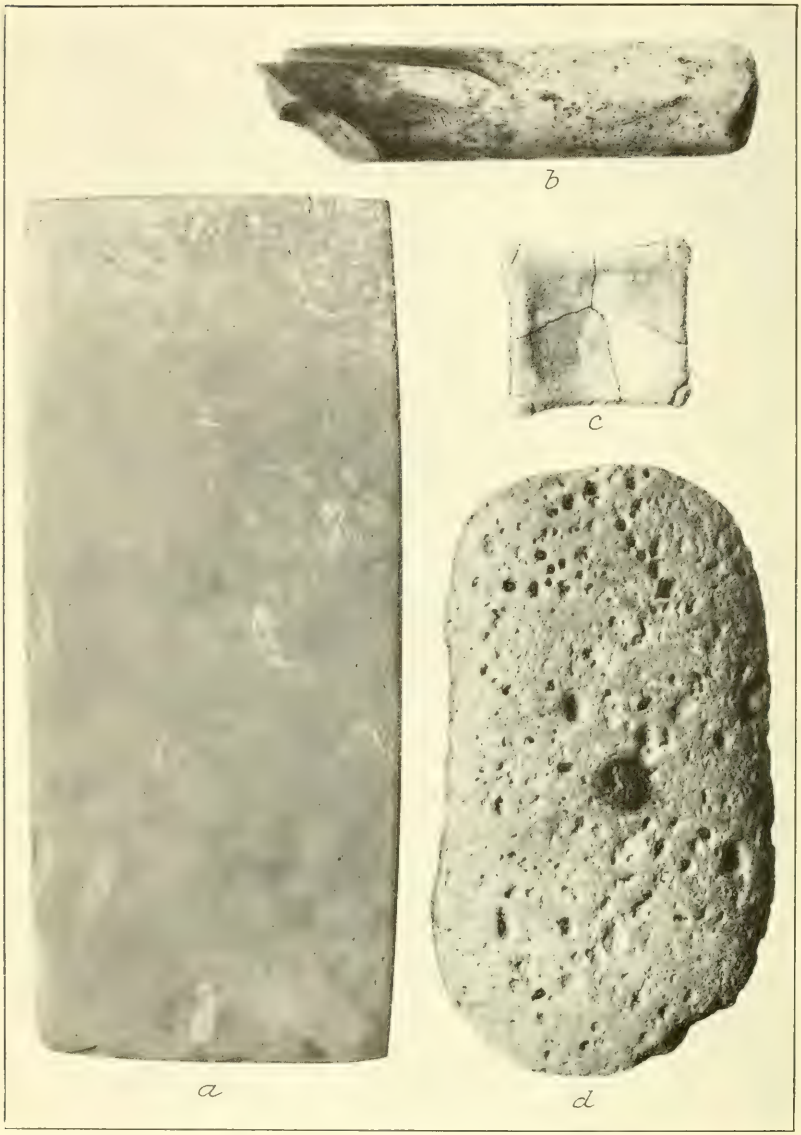
TYPICAL MILLING STONE



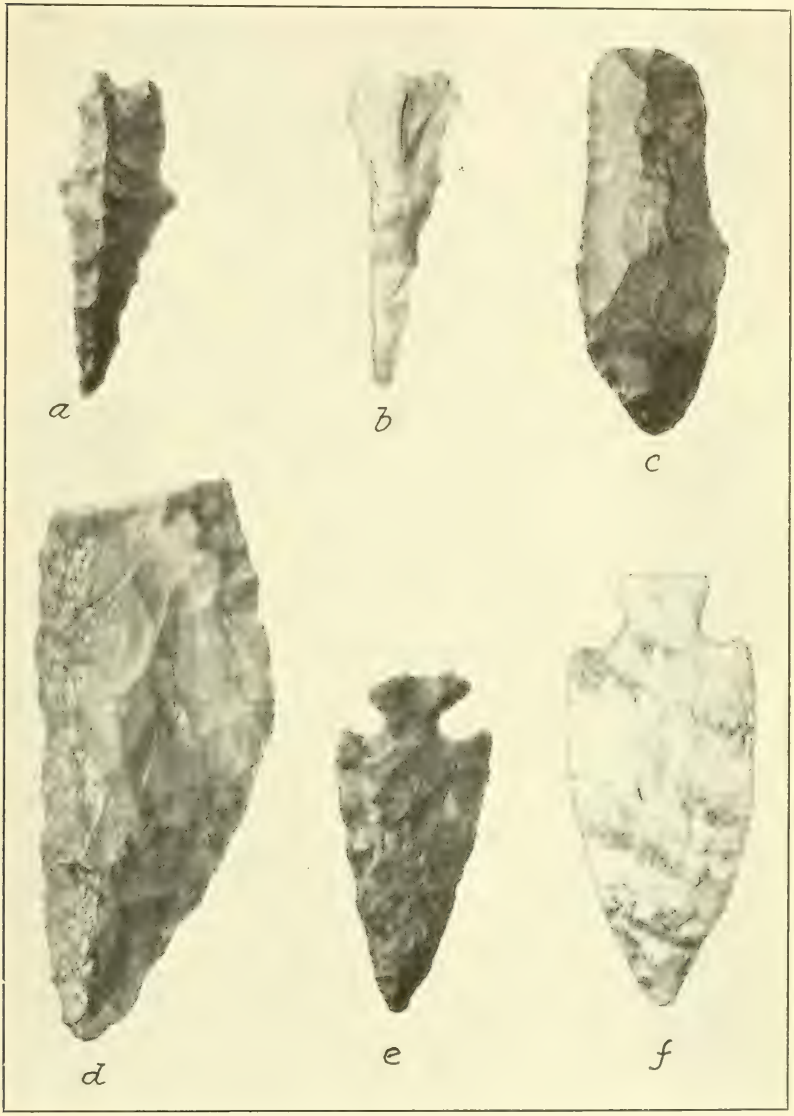
STONE AX HEADS AND MAULS



STONE BOWLS

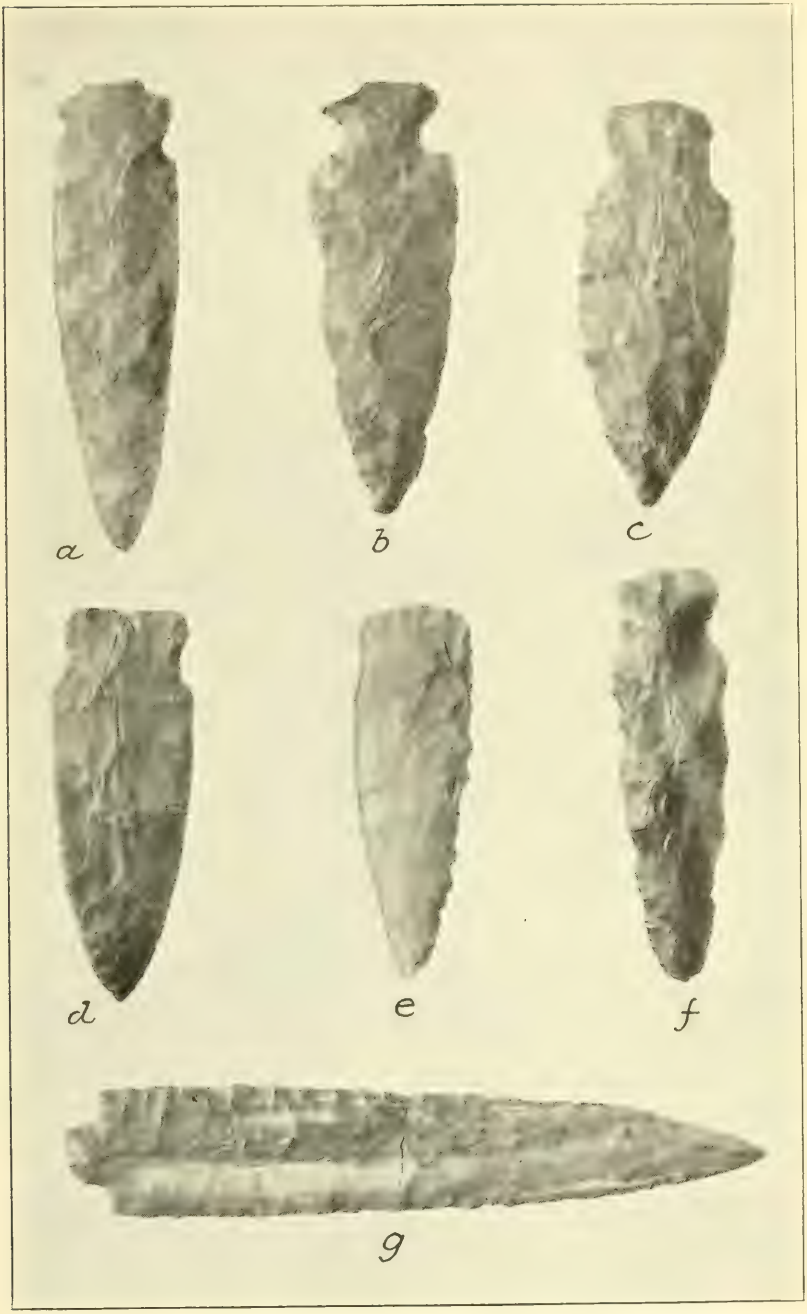


MISCELLANEOUS OBJECTS OF STONE

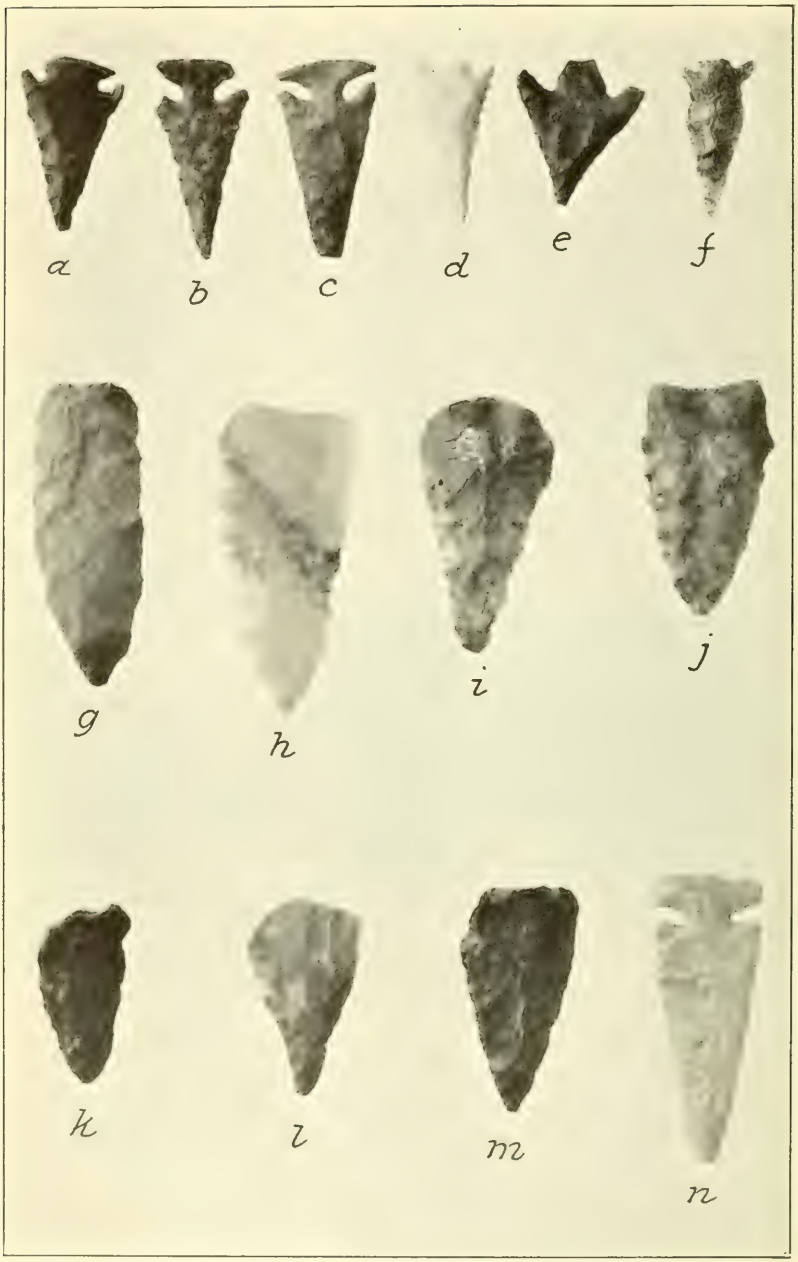


DRILLS AND KNIFE BLADES FROM THE PIT HOUSES

KNIFE BLADES AND SCRAPER FROM THE PUEBLO



PIT-HOUSE SPEAR POINTS

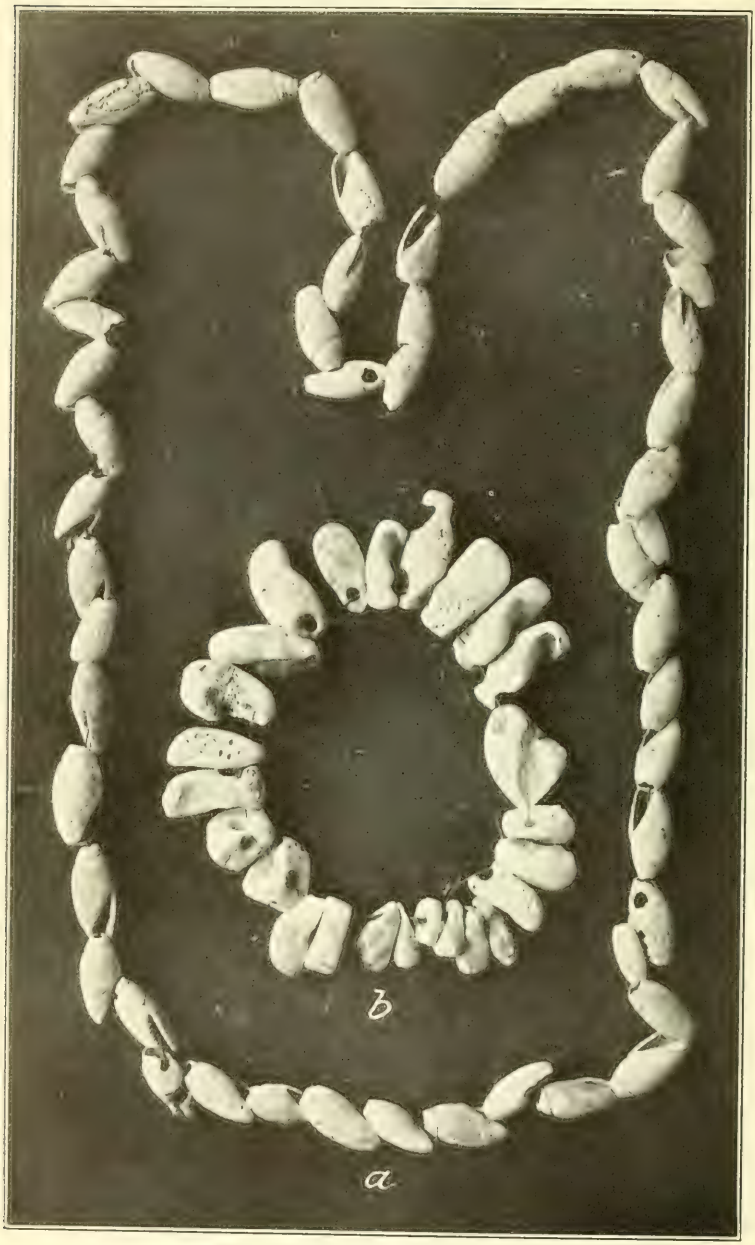


ARROWHEADS

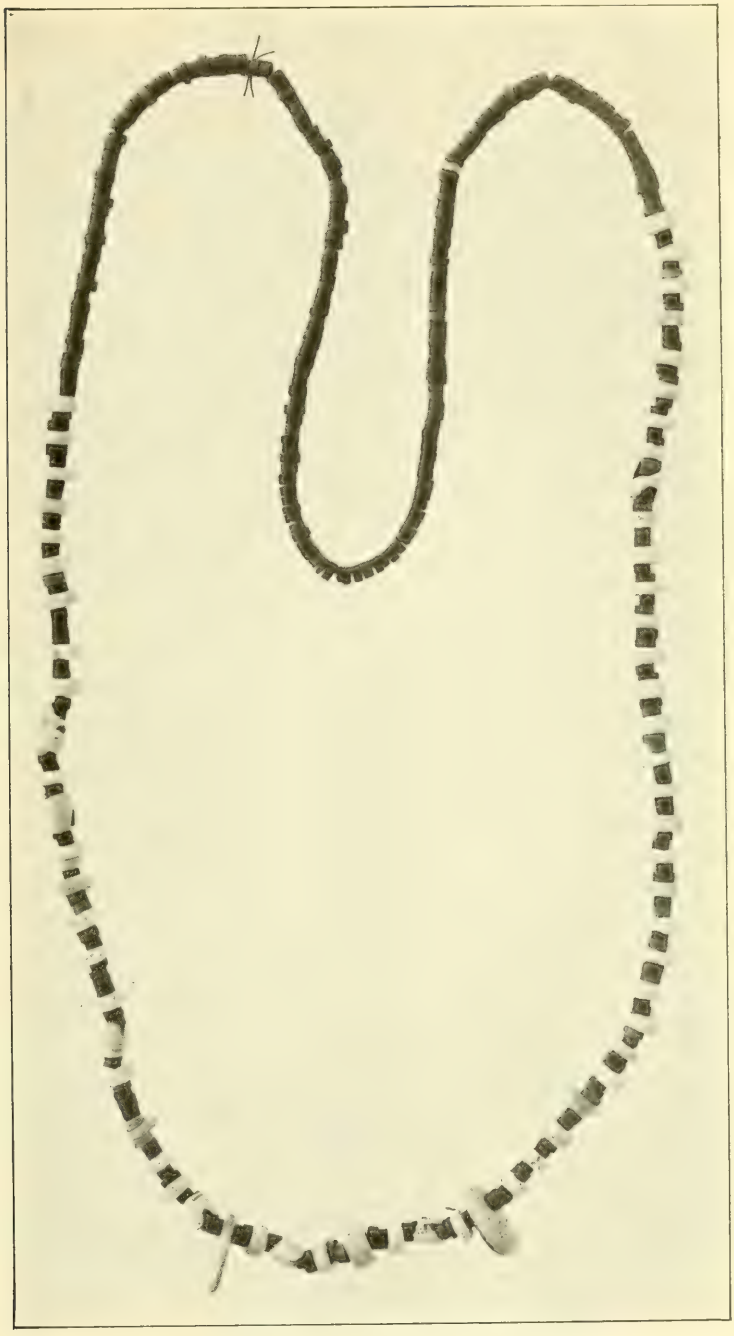
STONE PIPES

STONE PENDANTS FROM THE PIT HOUSES

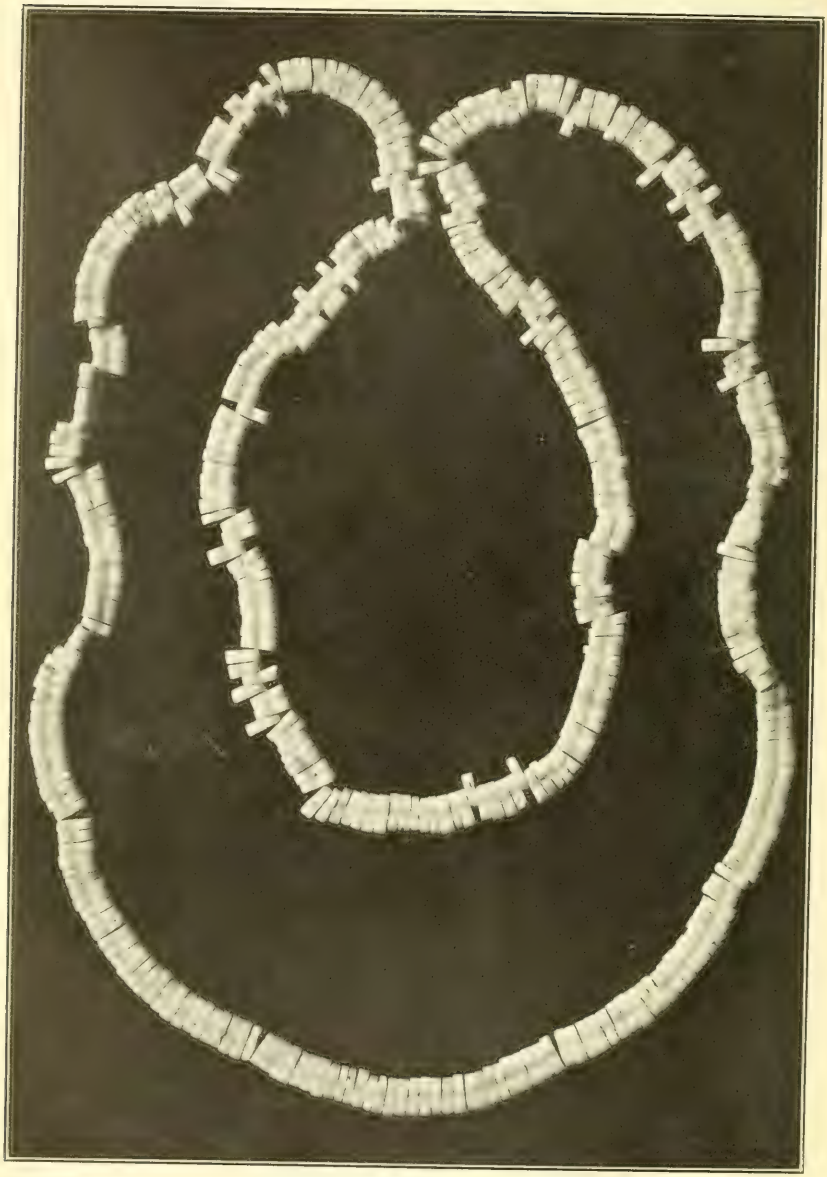
SHELL PENDANTS FROM THE PIT HOUSES



SHELL BEADS



NECKLACE OF STONE AND SHELL BEADS



NECKLACE OF SHELL BEADS

than the hurling type. Certainly the spear thrower or atlatl did not survive for any length of time, if at all, in the Pueblo era.

The group of arrowheads in the collection is particularly interesting because it shows that there was a distinct difference between the pit-house and pueblo horizons. The specimens illustrated in Plate 39 show this clearly. The top row, *a* to *f*, came from the older structures, while the middle and bottom rows, *g* to *n*, were found in the pueblo. As will be observed from the photograph, the typical pit-house arrowhead was one with notches set at an angle and down-raking barbs. The predominant pueblo form was one without tang or barbs. Where a tang and notches were employed the latter were chipped at approximately right angles to the long line of the head. This feature, which contrasts with the similar one in the pit-house series, is a definite period characteristic which has been observed in the Chaco Canyon and the San Juan region to the north.

Stone was also used in the manufacture of pipes. (Pl. 40.) These are of the tubular or cylindrical variety. No elbow forms were found. Most of those recovered from the sites were made from lava, a substance which would seem to be rather unsuited to the purpose because of its porous nature. A few of the specimens were fashioned from a rather hard, fine-grained shale, a kind of gray pipestone, so to speak. This material would readily lend itself to shaping and the pipes made from it are much superior in finish to those of lava. (Pl. 40, *e*.) One of the specimens is particularly interesting because it has a bone stem or bit inserted at one end. (Pl. 40, *a*.) The tube was actually in place, held by pitch gum, when the object was found. As mentioned previously, pipes of clay of the tubular type are frequently found in the northern portions of the Southwest, but in this region stone was apparently the prevailing material employed for the purpose. Hough found similar ones in the territory west of the Long H Ranch,[97] and they are in collections which came from the area to the south and farther west. Indications are that the stone pipe may be considered the southern and western form. All of those illustrated in Plate 40 came from the pit houses. No examples were found in the pueblo.

The only ornaments made from stone were pendants. (Pl. 41.) Turquoise, ferruginous shale, and a form of alabastar were the chief materials used. There does not seem to have been any great variety of shapes for this type of ornament, and as a matter of fact stone was not widely used for this purpose. The amount of turquoise present in the collection is relatively small. The popular and preva-

[97] Hough, W., 1903, pl. 52.

lent material, the thing to wear for decorative adornment in the region of the Twin Lakes, was shell. Hence the scarcity of stone pendants.

Objects of Shell

Through trade, or possibly as a result of journeys to the west coast, the dwellers in the pit houses and later pueblo had a large quantity of shell. This was used extensively in the manufacture of various kinds of objects for personal adornment. Pendants of different shapes, beads and bracelets were fashioned from this material. Among the shells the olivella, glycymeris, and abalone were those most frequently used. Some other kinds seem to have been employed on occasion, but the work necessary to produce the desired ornament many times removed features essential to the identification of the form, and for that reason it is not possible to tell what the shell is.

Characteristic pendant forms are illustrated in Plate 42. The first two, *a* and *b*, were made from abalone shell. The latter was known very early in the Southwest and ornaments made from it have been found in Basket Maker II sites. These particular specimens formed a pair. They were found together in a grave in a position which indicated that they had formed a part of a necklace. Objects *c* and *d* were made from glycymeris shell, probably from pieces of broken bracelets. Some form of clamshell was used for *e*. All traces of the original surface were rubbed off, however, and the series of grooves incised into the shell. The carved animal, *f*, is interesting. The Little Colorado area has furnished a number of examples of this kind of pendant. Doctor Fewkes found specimens carved from shell representing animals and frogs during his work at Chevlon ruins in Arizona.[98] The simple pendant *g* was made from a piece of abalone shell. It was worn, together with some other ornaments, on a cord around the neck of the owner. This was shown by its position on the skeleton with which it was found. A broken bracelet made from a large glycymeris shell furnished the material for *h*. The people frequently put damaged goods to a secondary use in this way. All of these specimens belong to the pit-house horizon.

The simplest form of bead, and that which was present in greatest numbers in the pit-house period, was made from olivella shells. (Pl. 43, *a*.) The latter lend themselves particularly well to such a purpose since all that is necessary to make good beads from them is to cut off one end. The perforation through which the suspension cord is passed is a natural feature of the shell. Curiously enough, the Basket Maker and Pueblo I peoples were those with whom this form of bead was most in vogue. Great quantities of them are

[98] Fewkes, J. W., 1904, figs. 50, 51.

found in association with Basket Maker burials. Frequently the mouth of the deceased was filled with them before the remains were interred and strings of them were placed in the grave. Large numbers of the olivella beads were found accompanying pit-house burials on the Long H Ranch. They were used in necklaces and bracelets and one burial indicated that the person had worn some sort of girdle composed of over 300 of them. Olivella shells, on the other hand, were quite scarce in the pueblo horizon.

The string of beads *b*, Plate 43, is unique in the collection. The beads were found in the earth around the wrist bones of a skeleton. The shell in them was so rubbed and cut during the process of manufacture and they have weathered to such an extent that it is not possible to tell what the original shell was. They also belong to the pit-house group.

Flat, circular beads were made from shell and stone. This type of bead was not at all plentiful in the pit-house period, judging from the few examples found, but was very much in style among the dwellers in the pueblo. An unusually fine necklace containing both forms was found in a pueblo burial. (Pl. 44.) Although the string of the original necklace had long since disappeared, the beads were lying in the earth as though strung. Consequently it has been possible to restore the necklace in its original form. It will be observed from the illustration that there is an occasional tubular bead made from an olivella shell. These differ from the olivella beads of the pit-house horizon in that both ends were cut off and only the central section of the shell used. The few olivellas in this string are the only ones which can be attributed to the pueblo period. In addition to the various forms of beads just described, this necklace has one large turquoise bead. The latter are very rare in the collection from the Long H Ranch. Both horizons seem to have had little turquoise. This necklace also has two small turquoise pendants, neither of which is of good quality stone.

One very fine necklace came from the pueblo horizon. The beads in it were cut in the shape of a figure 8. The perforations for suspension were drilled through the upper and smaller parts. The effect which a string composed of beads of this type gives is that of two strands rather than one. (Pl. 45.) The beads were made from pieces cut from glycymeris shell. Several fragments of this material with the beads roughed out but not completed were found in rubbish from the pueblo. The securing of a whole necklace of this variety was a particularly fortunate circumstance. Occasional stray beads have been found, but large numbers of them had not been encountered previous to the uncovering of this specimen. Furthermore, this particular necklace adds one additional bit of evidence toward estab-

lishing the beads as a late pueblo form. Kidder and Guernsey obtained some examples of the type during their work in northeastern Arizona. Although they were in a bowl of the Pueblo III period, it seemed that they might possibly have come from an older level and have been gathered and saved by the pueblo people.[99] W. K. Moorehead secured similar ones during his work at Pueblo Bonito in the Chaco Canyon. The latter fact, together with the distinct Pueblo III horizon which they occupied at the Long H Ranch, would indicate that the Kidder and Guernsey specimens belonged to that period also and suggests that the form is one which may be considered as characteristic of the Pueblo III period.

One of the most numerous forms of ornament possessed by the pit-house dwellers was that of the glycymeris shell bracelets and armlets. (Pl. 46.) They were found in varying numbers on the arm bones of many of the skeletons. The smallest number worn by any one individual seems to have been two, and the most found

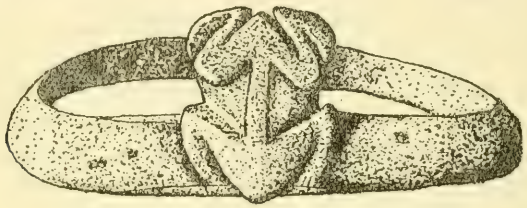
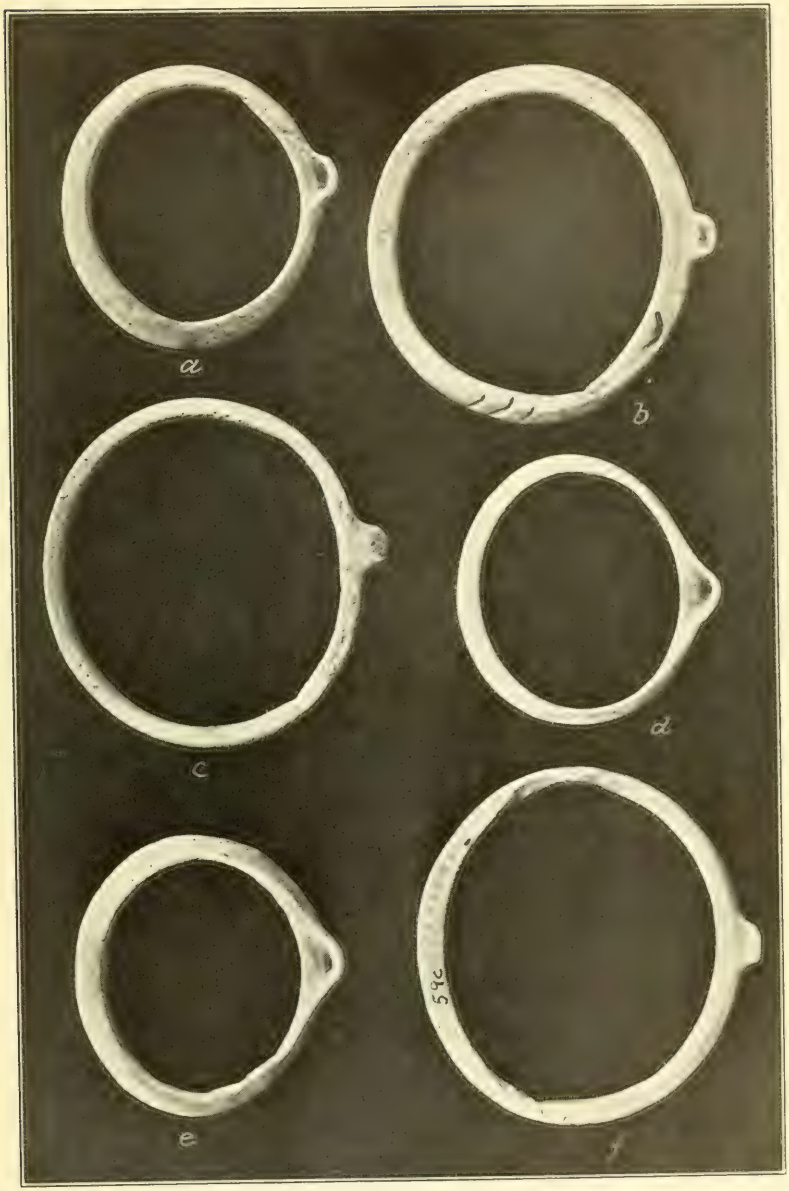


FIGURE 31.—Carved shell armlet

on one arm was 20. The majority of the burials, however, indicated that four was the average. The smaller forms seem to have been placed on the wrist or lower arm, while the larger were worn above the elbow and served as armlets. One very elaborate specimen was found. It has a frog carved in the shell at the point where the valve was situated. (Fig. 31.) Carved bracelets are not unique but they are not found in any great numbers. Doctor Fewkes secured one during the progress of his work at Elden Pueblo, near Flagstaff, in Arizona,[1] and an occasional example has turned up in the Mimbres and upper Gila regions. The Elden Pueblo bracelet has a shell carved in place of the frog. Bradfield found a bracelet in the Mimbres, however, which is embellished with a frog. The Mimbres specimen is probably about contemporaneous with the Long H Ranch example, but the Elden Pueblo one comes from a late Pueblo III ruin. None of the bracelets from the Long H Ranch came from the pueblo horizon. This may or may not have significance. It may be that no individual in the pueblo wore them, or

[99] Kidder, A. V., and Guernsey, S. J., 1919, fig. 68, *c*; pl. 62, *l*; p. 151.
[1] Fewkes, J. W., 1927, fig. 216.



BRACELETS OF SHELL

CHARACTERISTIC POSITION OF INTERMENT

again it is possible that the excavations merely failed to uncover any. In view of the fact that they are present in the Pueblo III horizon elsewhere in the region it would seem that no special period significance can be attached to them.

The shell used in the manufacture of bracelets is found only in the Gulf of California and shows that there must have been a rather spirited trade between the two areas. Farther south and west, the nearer the ruins are to the source of supply, arm ornaments are more numerous. In the northern and eastern portions of the Southwest area such bracelets are rather scare.

Minor Objects, Summary and Conclusions

The lesser objects of the material culture of the ancient inhabitants of the Long H Ranch represent, with a single exception, only the things made from imperishable materials. Out of the great bulk of objects fashioned from substances subject to the agents of decay which the people must have used in their daily life only a few charred fragments of basketry were secured. The objects made from more permanent materials include pottery containers, stone and bone implements, and stone and shell ornaments. Two distinct periods are represented in the collection. One consists of the specimens from the pit houses and the other those from the pueblo ruin. Certain forms are present in only one of the horizons, others show marked differences according to their provenience, while some forms are the same in both levels.

Pottery shows some variation in paste and tempering material, but the greatest period differences are to be observed in surface finish, form, and decoration. Culinary vessels from both levels have a granular paste with temper of sand and ground stone. The pueblo specimens contain a larger proportion of sand than do the pit-house jars. The nonculinary wares of the pit-house black-on-white group have fine-grained paste with a small amount of sand and particles of light-colored ground rock for tempering. This class of containers in the pueblo collection has an even finer, more compact paste. Ground potsherds constituted the main temper employed. Black interior vessels have a porous, sand-tempered paste. The only period difference is one of fineness. The pueblo forms are slightly more compact and less granular in cross section. Black-on-red vessels, which were found only in the pueblo horizon, have a granular paste tempered with fragments of dark-colored rock.

The pit-house culinary wares in most cases have smoothed surfaces, although a few examples are characterized by smooth bottoms and banded necks. The cooking jars from the pueblo are

of the indented corrugated variety. On some the indented coils appear only on the neck portion, the bottom being smoothed as in the case of the pit-house jars, but the majority have the entire exterior surface corrugated. All of the nonculinary vessels have smoothed surfaces. The bowls, regardless of horizon, have a better finish on the interior than they do on the exterior. This may be attributed to the fact that the interior was the field for decoration. In the pit-house group only 24.5 per cent of the specimens have a slip, while all of the pueblo vessels were so treated. If pit-house bowls exhibit a slip it is present both inside and out. On most of the pueblo specimens it is present only on the interior. On an occasional bowl in the latter group the slip was carried down a short distance below the rim on the outside, but not over the entire surface. A few of the pit-house vessels have "fugitive red" on the exterior, the survival of a typical Basket Maker III feature, while it is totally absent in the pueblo group.

There is no great variety of form in the containers from either the pit houses or the pueblo. The vessels comprise culinary jars, water jars, pitchers, seed jars, canteens, and ladles. The outstanding difference in the culinary jars, as previously mentioned, is that of surface finish. Water jars vary considerably in the two periods. The pit-house shape was ovoid with a very squat neck which was little more than a pronounced rim on the orifice. The pueblo vessels of this group had globular bodies with a slightly depressed top, definite but short necks, and restricted orifices. Bowl shapes in the two horizons were practically the same. The main period difference to be observed is in the rims. Those from the pit houses have thin rounded lips, the walls of the vessels tapering slightly below the rim. The pueblo forms have a direct lip which is squared or flattened. Pitchers show marked variations in form and method of handle attachment. The pit-house types include a globular body with tapering neck and only a slight suggestion of a shoulder; a globular body and tapering neck with projecting nubbins around the shoulder; pitchers with segmented necks; and bird-shaped vessels. The pueblo containers of this group have more ovoid bodies with depressed tops and pronounced shoulders. The necks are longer and have vertical sides. Handles in the pit-house group extend from the rim of the orifice to the slight suggestion of a shoulder, while in the pueblo series they join the neck some distance below the rim. Seed jars were found only in the pit houses. Canteens from the pit houses are pear-shaped with a small orifice and no neck. The pueblo form is globular with a distinct though short neck. Ladles in the pit-house wares show the half-gourd and bowl with concave handle forms. The pueblo dippers were all of the bowl and tubular-handle type.

The elements in the design on the painted wares of the pit-house period consist of zigzag, parallel, and parallel stepped lines; squiggled lines; filled triangles and dotted triangles; volutes and ticked volutes; interlocking frets; checkerboard; concentric rectilinear and curvilinear figures. These were combined in patterns of the bipartite, tripartite, and quadrate forms. They were used in designs composed of solid elements bordered by series of parallel lines. They formed figures which were placed at opposite sides of the field for decoration. Spiral figures and pendent panels were developed from them and they were painted in band designs. The pueblo decorations have more heavy, solid elements and the parallel bordering lines are noticeably absent. The main elements employed were pennantlike symbols, triangles, rectilinear and curvilinear frets, and straight-line hachure. The latter is in distinct contrast to the hachure of the pit-house designs which is composed of squiggled lines. The pueblo patterns are chiefly of the all over and band form.

The pit-house pottery in its nature and style of decoration shows distinct affiliations with the early wares of the Chaco Canyon and portions of the northeastern San Juan area. Although unquestionably a local product it was under a strong northern influence. Pottery comparable to it is also found in parts of the Rio Grande region and in some of the older Mimbres and upper Gila sites. These widespread resemblances may be attributed to the fact that they belong to a period when most of the pottery was quite generalized in its nature, not crystallized into local specializations such as developed in the Pueblo II and III periods. On the basis of pastes, shapes, and style of decoration in the nonculinary wares, together with the form and character of the culinary vessels, there can be no hesitancy in placing the pit-house pottery in the Pueblo I period. It is, however, typical of the eastern phase of Pueblo I ceramics, a phase which seems to have been under the influence of the Chaco Canyon centers and which is different from the Pueblo I, formerly called pre-Pueblo, of the Marsh Pass or Kayenta district. The eastern phase seems to have been more widely distributed than the western. It extended from the Mesa Verde to the upper reaches of the San Juan, down the Rio Grande, through the Chaco Canyon to the upper Gila and Mimbres. The boundary line between the eastern and western forms is not sharp. There is a strip between the Mesa Verde and the Kayenta districts, extending south to the Little Colorado, where they overlap. Specimens of the eastern form have been found in the Kayenta region and examples of the western phase are in collections from the Chaco Canyon and the upper San Juan. Thus far, however, not a single fragment from a western Pueblo I vessel has appeared in collections from the Mesa Verde.

The pueblo pottery in most of its aspects is definitely of the Pueblo III period. A few sporadic pieces, such as the smooth-bottomed indented corrugated ware, suggest a late Pueblo II form of ceramics. The series as a whole, however, could not be considered other than a Pueblo III collection. The specimens strongly suggest a fusion or mixture of cultures. Some of the vessels are distinctly Chacoan in type, while others are unquestionably upper Gila. There is only a very small percentage which could be termed characteristic Little Colorado, and that is in the black-on-red group. The pueblo pottery may be summed up in the statement that it is Pueblo III, predominantly Chaco-upper Gila in character with a slight admixture of Little Colorado black-on-red.

Basketry remains are too meager to serve as a basis for any comprehensive conclusions. All that can be learned from the pieces secured is that both horizons were characterized by double-rod-foundation baskets and that the pueblo work was much finer than that of the pit-house peoples. The stitch employed in the pueblo examples is as fine as any found in the pueblo horizons in the Southwest.

Bonework does not exhibit a marked variety of forms. Awls constitute a majority of the implements in this group. They were made from specially cut pieces, from fortuitous splinters, and from bones only slightly modified from their original form. The main difference between the pit-house and pueblo tools is in the group of specially cut awls. The pit-house type is a short, stubby one, while the pueblo form is long and slender. The pit-house people made and used a broad, flat bodkin type of implement, which is missing in the collection from the pueblo. On the other hand the pueblo horizon had a form of scraper or flesher which was not made in the earlier period. These fleshers are distinctly a northern type of implement. Bone tubes, possibly used as beads, were found in both levels. Bone rings, however, occurred only in the pueblo horizon. These rings are very reminiscent of examples found in the Pueblo III ruins of the Chaco Canyon.

Objects of stone show that two methods of manufacture were used. One group was made by the pecking and grinding technique, the other by chipping and flaking. Those of the first group are metates, manos, axheads, mauls, bowls, paint dishes or palettes, slate tablets, pipes, and ornaments. The second group consists of drills, knife blades, spear points, and arrowheads.

The open end, grooved metate was used in both horizons. There was no indication that these milling stones were used in bins, but that they were raised above the floor on stones. The metates in a slight degree suggest the form which is called the Utah type. Two

forms of mauls were found. One is cylindrical with rounded ends and hafting groove completely encircling the stone. The other is oval with tapering, flattened ends, the hafting groove occurring only on three sides. Both forms were obtained from the pit houses while only the oval type was found in the pueblo. Ax heads also exhibit two forms. One has a short bit, the other a long cutting edge. Both were present in the pit houses. Only the short-bitted form was obtained from the pueblo. The latter is the characteristic Little Colorado form of ax head. All of the ax heads are grooved. The groove may completely encircle the stone or appear on only three sides. There is no correlation between type of head and form of groove; the two kinds of grooves are found on the two styles of heads. The stone bowls range from crudely finished specimens to finely executed objects. They were found only in the pit houses. In form and character they are quite similar to those found in pueblo ruins along the upper Gila. Slate slabs occurred only in the pueblo horizon. They are like those found in the upper Gila and Little Colorado cultures. Paint dishes or palettes were a pit-house feature. Pipes were all of the tubular variety and were found only in the pit houses.

Chipped implements show some differences with respect to horizon. This is most marked in the groups of arrowheads and spear points. The pit-house arrowheads have tangs and down-raking barbs. The predominant pueblo form was one without tang or barbs. Where the latter are present they are at right angles to the long line of the head. Spear points were found only in the pit houses. On the other hand unhafted chips worked into scrapers were secured only from the pueblo. The pueblo stone workers also made long, parallel-sided knife blades which were unknown, apparently, in the pit-house horizon.

Shell obtained from the western ocean and the Gulf of California was extensively used in the manufacture of ornaments. Included in the specimens are abalone, olivella, and glycymeris. Pendants, bracelets, and beads were fashioned from this material. Abalone was used in the manufacture of pendants, glycymeris for bracelets and beads, and olivella for beads. The chief beads used during the pit-house period were made from olivella shells. The pueblo era saw flat circular beads made from shell and stone the vogue. The latter period also had a double-lobed figure 8 bead which was not present in the pit-house era. Shell bracelets were found only on skeletons from the pit-house level. This is to be regarded only as a local difference, however, as at other sites shell bracelets are plentiful in later pueblo periods.

The lesser objects of the material culture as a group show some interesting things. Pottery indicates a distinct northern influence in the early period, a fusion of northern and southern types in the later horizon. Bone implements are quite like those in the north. Stone objects show considerable southern and western traits, with the exception of the pit-house arrowheads which are like those of the north and northeast late Basket Maker III and Pueblo I sites. Shell ornaments are distinctly southern and western. There is a decided indication of a fusing of different cultural forms, in the pueblo horizon especially. The material culture suggests that the location was one which was peripheral to several culture centers and that the people adopted features from each. Two periods, Pueblo I and Pueblo III, are represented. As in the case of the house types, there is a break between the two. Pueblo II seems not to have been present at these sites. The Pueblo I is distinctly an early phase of that period. There is nothing in the specimens collected to even hint at a possible shading into Pueblo II. The Pueblo III specimens are clearly of the early and middle phases of that period. A few of the vessels, such as the indented corrugated culinary jars with smoothed bottoms, suggest a Pueblo II origin but in view of the tendency to survival of forms and the lack of other Pueblo II features no special emphasis can be placed on them. The group as a whole must be considered Pueblo III.

HUMAN BURIALS

All indications were that inhumation was the only method of disposing of the dead practiced in the vicinity of the Twin Lakes. There were, however, a number of different forms of interment. The pit-house dwellers made use of any available hole or depression, such as abandoned storage pits and the ventilators of no longer occupied houses, or when necessary scooped out shallow pits in the top soil or in a refuse mound as a final resting place for their dead. No attempt at orientation was made. In the group of pit-house burials as a whole the heads of the interred were found pointing toward practically every direction of the compass. Despite the irregularity of direction, though, there was a consistent plan of body position. With very few exceptions, the deceased was placed on the back, the arms were folded across the body, and the lower legs were drawn against the thighs with the knees projecting upward. (Pl. 47.) The few variations from this position were noted where the burials had been made in the ventilator of an abandoned house or in a small storage pit. Under such conditions it was occasionally necessary to force the body into a small open-

ing, and as a consequence little attention could be paid to position. The practice of covering the remains with a large stone slab, frequently observed in other districts, was not followed here. This probably, in part, was due to the lack of stone in the vicinity. Customs may vary from section to section, regardless of conditions, but lack of suitable materials does have a decided effect on some practices.

Mortuary offerings were put in the grave beside the body. No definite place was assigned to the funerary deposits, however. In some cases they were found near the head, in others at the feet, and in additional instances were in all positions between these two extremes. Contrasting with this irregularity, the people were quite consistent in one feature. Three kinds of pottery were always placed in the grave. A culinary jar, a black-on-white bowl, and a black-interior bowl formed the group. Where there were more vessels the custom prevailed and the offerings were in multiples of the usual series. For example, a number of interments had 2 culinary jars, 2 black-on-white bowls, and 2 of the black-interior containers. Furthermore, it was found that the top of the culinary jar was always covered with an inverted black-interior bowl. This regularity in the nature and number of mortuary vessels is rather unusual in the Southwest. Where beads or other ornaments were in the grave they seem to have been purely the personal possessions which the person wore in life and which were left on the remains in death.

The finding of a skull without additional parts of the skeleton in the ventilator of house A, Group No. 1, presents a rather puzzling problem, for which there appears no solution. Sporadically throughout the Southwest the interment of only a portion of a body is discovered. One of the most striking of these was a burial of hands in northwestern Arizona.[2] The careful burial of two crania was noted at a Pueblo I site in southwestern Colorado,[3] and diggers have occasionally reported the finding of a headless skeleton. Thus far no satisfactory explanation for such practices has been forthcoming. Such a find always opens a vast field for the play of the imagination but gives little in the way of fact to serve as a foundation on which to erect a theory. Consequently, it is considered better to err on the side of conservatism and merely record the occurrence than to fabricate a probably erroneous explanation for it.

There was nothing in the finding of the skulls in Colorado or at the Long H Ranch to imply that the people could be considered, in any sense of the word, head hunters. A purely conjectural sug-

[2] Morris, E. H., 1925, p. 291.
[3] Roberts, 1930, p. 163.

gestion made in the discussion of the Colorado find was that it is possible that they may have been the heads of men who had been killed or died while away with war or hunting parties. It was not possible to carry the remains home for burial, so in lieu of the whole body the head was removed and taken back for proper interment. Primitive peoples in other parts of the world have been known to do this and it may be that on occasion the early dwellers in the Southwest did likewise. Some evidence of sacrificial cannibalism has been recorded in the Southwest, but in neither of these cases was there anything to indicate such a ceremony.

Another feature of interest in connection with the pit-house burials is the evidence that now and then children were interred close to fire pits. This practice was not uncommon in the Southwest and probably represents a phase of a custom which was world-wide in its distribution, namely, that of keeping the family circle unbroken, even in death, by burying the deceased close to the hearth. Traces of this custom have been observed among some of the modern pueblos in the burial of dead beneath the floors of houses. This practice was also quite prevalent among certain of the prehistoric peoples in this region, particularly during late pre-Spanish times. Occasionally it was done in the early days of the culture, but not to so great an extent.

The burials from the pueblo were found in the refuse mound located east of the ruin. The number was small compared to what it should have been for the size of the community and the length of time which it was occupied. There is no explanation for this beyond that of the possibility that many were missed because of having been placed elsewhere and their presence not revealed by the investigations. Those which were uncovered differed from the pit-house interments in a number of respects. In contrast to the latter, all were oriented. The head in each instance was in an easterly direction. The body had been placed on its side with the legs drawn up and the arms folded so that the hands were near the face or under the head. There did not seem to have been any special choice of side as the burials were about evenly divided between those lying on the right and those on the left. None had been placed on the back, the typical pit-house position, and there was no use of covering stones.

The mortuary offerings accompanying the pueblo burials were near the head, usually in front of the face. There was no regularity of offerings in this group like that observed for the pit-house interments. Presumably whatever could be spared was put into the grave. In some instances there were no whole objects, just fragments of bowls or culinary jars.

Skeletal remains from the two periods offer some interesting comparisons. The pit-house people were both long-headed and broad-headed; had deformed and undeformed crania. Both groups exhibit examples of a slight occipital flattening and both have individuals with normal skulls. The significance in this lies in the fact that here there was an unquestionable mixing of stocks and customs. The introduction pointed out, it will be recalled, that the first sedentary peoples in the Southwest, the Basket Makers, were characterized by long, undeformed heads. The earliest Pueblo peoples, on the other hand, had short, broad heads. Soon after their arrival in the region this broad-headedness was emphasized by a flattening of the back or occipital portion. Whether this was intentional or accidental is not known. In view of the fact that many peoples of lower cultures are wont to practice deformation of a kind which emphasizes natural characteristics it would seem that the custom may well have been intentional. The inception may well have been accidental, but the continuation was probably through choice. At all events, the flattening may definitely be attributed to the type of cradle board developed by the pueblo peoples. This form of carrier for infants was only in partial use during the pit-house era, judging from the fact that many of the skulls are undeformed. Its use, however, was not confined to the broad-headed group of the Twin Lakes locality, as some indisputable long heads have a slight deformation of the type which it produced. Also, some of the broad heads do not show it, which suggests that it had not been completely adopted. The association of two peoples is definitely indicated by the two head forms, the fusing of cultures by the occasional deformation of a long head.

The skulls of the skeletons belonging to the pueblo horizon are in marked contrast to those of the pit-house era in that all have a pronounced occipital flattening. The latter is so marked that it is not possible to tell whether the person had belonged to the long-headed or broad-headed group. It is quite probable that by the Pueblo III period, that of the Long H Ranch communal dwelling, the amalgamation of stocks had reached a point where head form would have little significance. Furthermore, any that it might have had would be lost because of the widespread practice of pronounced cranial deformation with its resultant obliteration of distinctive features.

GENERAL SUMMARY AND CONCLUSIONS

During the summer of 1929 archeological investigations were conducted on the old Long H Ranch at the Twin Salt Lakes in Apache County, eastern Arizona. At the end of the field season 18 pit houses, the remains of 3 jacal structures, and a pueblo ruin with 49

rooms and 4 kivas had been uncovered. Evidence was that the different forms of houses were built in the order named. Some of the pit houses were unquestionably the oldest domiciles and stratigraphic evidence demonstrated clearly that the pueblo was later than the other dwellings.

There were two kinds of pit houses. The subterranean portion of one consisted of a roughly circular or oval, rarely rectangular, pit with walls rising more or less vertically from the floor to the ground level. The other group had larger pits, were oval or circular in contour, and had an encircling bench as an upper wall feature. The smaller houses are believed to have been the early form and the larger ones the ultimate development. The superstructure erected over the pit in both forms was supported by four upright posts set in the floor. On top of these was a rectangular framework of four stringers upon which the smaller poles which formed the flat ceiling and sloping side walls rested. In the small houses the slanting poles extended from the ground to the rectangular framework, but in the large structures their butts rested in the angle formed by the top of the bench and the rear wall of the pit. An opening in the center of the flat portion of the roof served as a combination smoke hole and entrance. This wooden framework was covered with leaves, brush, bark, reeds, and earth.

Characteristic interior furnishings in the pit dwellings consisted of a ventilator at the southeast side of the room, fire and ladder pits near the center, a deflector between the ventilator opening and fire pit, a sipapu or symbolical representation of the mythical place of emergence, and holes for the storage of small objects. All of these features were not present in every case but a good proportion was noted in each house. The ventilator-fire pit-sipapu complex may be considered typical. This group of features was one which survived in later periods in the ceremonial chambers of the communal dwellings. The latter unquestionably represent a survival for ceremonial purposes of the old original type of house and clearly indicate that where most of the rites in the early stages of the cultural development took place in the family dwelling in later periods a special chamber was provided.

The pit houses were found to occur in groups of from four to six, several of which might constitute a village. These house clusters are thought to represent a single family group or clan. In three of them the central structure was larger than those surrounding it and suggested that already a definite ceremonial significance was becoming attached to one certain building. It was postulated, in this connection, that this feature possibly represented the prototype of the kiva of later periods.

The small houses were found to be quite reminiscent of structures belonging to the end of the Basket Maker III period. The larger ones were suggestive of similar ones belonging to the Pueblo I period uncovered in the Chaco Canyon in northwestern New Mexico and in southwestern Colorado. In general the pit houses show a closer resemblance to forms excavated in the north than they do to those found in the south and southwest.

Meager evidence on the jacal dwellings was that their walls had consisted of upright poles covered with mud. It is supposed that they had flat roofs. They ranged from single to several roomed houses. They indicated some similarity to jacal houses of one phase of the Pueblo I period in southwestern Colorado. Lesser objects found in association with the jacal remains demonstrated that they were contemporaneous with the large pit dwellings. This variation in house types in one community in a single period is characteristic of the early Pueblo horizon. Other sections have also shown that there was considerable fluctuation in the forms of domiciles erected by the people. It was during this stage in the development of the sedentary culture of the Southwest that the shift from subterranean to above-ground houses was made. As a consequence there was an interval of instability during which some lived in pit structures while others were building the new-style houses. At the beginning of the period the pit form, a survival from Basket Maker III days, was predominant. Toward the end the other types had practically supplanted it.

The pueblo ruin was found to have been a structure consisting of stone, adobe, and veneered walls. It had not been erected as a complete building but had grown from an original house of six rooms and a kiva through the addition, from time to time, of new rooms and units. There were five distinct stages in its development. The final phase was of particular interest because the builders simulated a stone structure by facing all of the outside walls with stone, while inside they were mainly of adobe. Throughout its various stages the dwelling seemed to have been more like those of the San Juan than the Little Colorado area. This was particularly true in the characteristics of the kivas. The great difficulty of the problem, in this connection, lies in the fact that too little is known about the eastern portion of the Little Colorado area. Practically nothing has been done in the small pueblo ruins in the region. The Long H Ranch building may well be typical of an older stratum which has not been definitely recognized, and which has much in common with the northern groups, at the same time being characteristic of the region. The type of kiva is unknown for this section. Only future investigations can determine whether the form

at the Long H Ranch is normal or an indication of a distinct northern intrusion. Consequently it is not possible to draw definite conclusions until that work has been done.

There is evidence of a distinct hiatus between the pit and jacal dwelling group and the pueblo form of structure. The differences are too marked to warrant any belief that the people ceased building one and adopted the other. Indications are that the site was abandoned and then reoccupied at a later date by a group building a more highly developed type of house. What caused the gap is not known. The most that can be said, from the facts in the case, is that there are pit-house and jacal remains of the early and middle Pueblo I period and pueblo ruins of the early part of period III, but no intervening II.

The bulk of the lesser objects of the material culture were found to consist of those made from imperishable materials. The group includes pottery containers, stone and bone implements, and stone and shell ornaments. Certain classes show marked differences between the pit-house and pueblo forms, while others are the same in both horizons. The variations are most marked in pottery, axheads and mauls, awls made from specially prepared bones, arrowheads, and certain types of beads. Pottery indicates a distinct northern influence, that of the Chaco cultures, in the early period; and a fusion of northern and southern types, Chaco Canyon-upper Gila, in the later horizon. Bone implements show many northern characteristics. Stone objects have many southern and western traits. Shell ornaments are clearly southern and western. The group of objects from the pit-house horizon is definitely Pueblo I in character while that from the pueblo is typically Pueblo III.

Disposal of the dead was by inhumation. The pit-house peoples placed the body on the back with the legs drawn up while the pueblo dwellers interred the remains on the side. The pit-house burials were made with no apparent attention to the direction of the head. In contrast to this the pueblo remains had the head toward the east. Mortuary offerings in the pit-house era consisted of three definite kinds of pottery put at any convenient place in the grave. The deposits with the pueblo remains were of no particular nature, but they were always placed at the head.

The skeletal remains show striking contrasts. The crania from the pit-houses exhibit long and broad forms, and show slightly deformed and undeformed examples in both groups. This is considered to indicate an unquestionable mixing of stock and customs. The long heads represent Basket Maker survivals, the broad heads Pueblo infiltration. Deformation of the occipital region bears evidence to the development of a new form of cradle board for the in-

fants, one which produced the head flattening. The fact that examples in both groups show the deformation while others do not suggests the adoption of the new cradle, a Pueblo contribution, by some of the Basket Maker peoples and also the failure of certain of the Pueblos to use it. The skulls from the pueblo horizon all have a very pronounced occipital flattening, showing that the form of cradle which produced it had been adopted by all. The deformation in this group is so marked that it is not possible to tell whether the person had come from a long-headed or broad-headed group, or a mixture of the two.

Taken as a whole, the material culture of the people who once dwelt in the vicinity of the Twin Salt Lakes suggests that the location was one which was peripheral to several centers and that features from each were adopted. The fact that there are more which show northern origins, those reminiscent of the Chaco cultures especially, may be attributed to the fact that that center was long a leader in the development of the Pueblo pattern. In the periods when the pit-houses and later pueblo were built it was in its heydey. The Little Colorado and Rio Grande cultures had not yet attained the prominence which they reached in the following period, Pueblo IV, hence their effect was negligible.

APPENDIX

Table I.—Measurements of Rooms in the Pueblo Ruin

Room No.	Length through the center			Breadth through the center		
	Ft.	*in.*	*Meters*	*Ft.*	*in.*	*Meters*
1	9	4	2.844	7	9	2.362
2	11	3	3.429	7	8	2.336
3	7	10	2.387	7	6	2.286
4	8	4	2.540	7	0	2.133
5	11	6	3.505	6	8	2.032
6	15	0	4.572	8	3	2.514
7	14	6	4.419	8	7	2.616
8	15	6	4.724	6	2	1.879
9	14	9	4.495	7	2	2.184
10	14	6	4.419	4	10	1.473
11	14	10	4.521	8	10	2.692
12	9	0	2.743	6	0	1.828
13	6	10	2.082	4	2	1.270
14	11	8	3.556	8	0	2.438
15	11	3	3.429	6	5	1.955
16	11	3	3.429	9	7	2.921
17	10	6	3.200	5	0	1.524
18	11	8	3.556	8	0	2.438
19	12	4	3.759	7	5	2.260
20	12	9	3.886	9	10	2.997
21	19	0	5.791	8 3	6 6	2.590 1.066
22	23	8	7.213	3	9	1.143
23	10	9	3.276	8	3	2.514
24	10	8	3.251	5	0	1.524
25	12	0	3.657	7	3	2.209
26	5	6	1.676	5	2	1.574
27	8	3	2.514	5	2	1.574
28	6	0	1.828	4	4	1.320
29	10	8	3.251	6	0	1.828
30	10	4	3.149	8	5	2.565
31	10	6	3.200	5	10	1.778
32	26 22	6 8	8.077 6.908	2 3	2 0	0.660 0.914
33	13	4	4.064	8	7	2.616
34	10	8	3.251	5	8	1.727
35	6	6	1.981	5	9	1.752
36	10	4	3.149	8	6	2.590
37	10	6	3.200	5	7	1.701
38	10	2	3.098	7	3	2.209
39	10	5	3.175	7	4	2.235
40	10	6	3.200	7	2	2.184
41	14	10	4.521	7	8	2.336
42	13	5	4.089	7	6	2.286
43	8	5	2.565	6	7	2.006
44	6	4	1.930	6	7	2.006
45	10	5	3.175	6	8	2.032
46	10	2	3.098	6	6	1.981

TABLE 1.—MEASUREMENTS OF ROOMS IN THE PUEBLO RUIN—Continued

Room No.	Length through the center		Breadth through the center	
	Ft. in.	*Meters*	*Ft. in.*	*Meters*
47	11 5	3.479	7 2	2.184
48	13 10	4.216	7 6	2.286
49	14 5	4.394	7 5	2.260

	Diameter through the ventilator				Diameter at right angle to ventilator			
	Total		Inside bench		Total		Inside bench	
	Ft. in.	*Meters*	*Ft. in.*	*Meters*	*Ft. in.*	*Meters*	*Ft. in.*	*Meters*
Kiva A	15 2	4.622	12 4	3.759	15 6	4.724	14 1	4.292
Kiva B	18 4	5.588	14 0	4.267	19 2	5.842	15 4	4.673
Kiva C	16 1	4.902	----	----	14 7	4.445	----	----
Kiva D	19 6	5.943	14 9	4.495	16 0	4.876	14 9	4.495

TABLE 2.—SIZE AND PROVENIENCE OF OBJECTS ILLUSTRATED IN TEXT FIGURES

Figure	Height		Diameter		Provenience	Field No.	National Museum No.
	Inches	Centimeters	Inches	Centimeters			
21, a	3⅜	8.5	7 5/16	18.5	Burial south of pueblo	261	350870
b	3 15/16	10.0	8 3/16	20.7	Mound E, burial 14	352	350925
22, a	3⅞	9.8	8	20.3	Mound E, burial 12	338	350919
b	3½	8.9	7 15/16	20.1	Mound E, burial 21	386	350942
c	2¾	6.9	6⅛	15.5	Burial 6-A	44	350676
d	3⅜	8.6	7 1/16	19.2	Burial 3-B	79	350706
23, a	4	10.2	7½	19.0	Mound E, burial 21	387	350943
b	3¾	9.5	8⅛	20.6	----do	388	350944
24, a	3 5/16	8.4	8¼	20.8	Burial 5-B	87	350712
b	Fragmentary, no measurements.				Burial west of C, group 2	238	350854
25, a	4 3/16	10.6	8½	21.5	Burial south of pueblo	260	350869
b	3⅞	9.8	8	20.3	Burial 5-B	90	350714
26, a	3⅝	9.2	7½	19.1	Refuse west of C, Group 2	233	350848
b	Restored from fragments.						
27, a	3 9/16	9.0	6½	16.5	Burial 2-A	22	350661
b	3 5/16	8.4	8⅛	20.6	Burial south of pueblo	256	350866
c	3⅜	8.5	6	15.1	Mound E, burial 18	372	350938
d	2⅜	6.0	6⅜	16.1	Burial 3-B	76	350704
28, a	2 5/16	5.8	6 5/16 5	15.9 12.7	Burial west of C, group 2	232	350847
b	2⅜	6.0	6¼ 4¼	15.8 10.7	----do	236	350852
29, a	Restored from fragments				Pueblo		
b							
30, a	----do				----do		
b							
31	Diameter through valve is 3½ inches (8.8 cm.).				Burial 2-C	119a	350743

TABLE 3.—SIZE AND PROVENIENCE OF OBJECTS ILLUSTRATED IN PLATES

Plate	Height		Diameter		Provenience	Field No.	National Museum No.
	Inches	Centimeters	Inches	Centimeters			
11, a	9⅝	24.5	9 7/16	24.0	Burial 8-A	49	350679
b	9 1/16	24.6	10⅛	25.7	Burial G-3	193	350805
c	10 1/16	27.1	11¾	29.8	Burial 5-B	86	350711
d	13⅛	33.3	12¾	32.5	Group 1, A	147	350761
e	5¾	14.6	6 9/16	16.6	Group 2, B	210	350821
f	6⅝	16.7	6⅞	17.5	Burial E-21	385	350941
12, a	4⅞	12.3	4¼	10.8	Burial E-6	314	350901
b	5⅛	13.0	4⅞	12.3	Burial E-1	302	350888
c	2 13/16	7.4	4 13/16	12.2	Burial E-4	310	350896
d	5⅛	12.9	4⅝	11.8	Burial E-1	303	350889
e	5¼	13.3	5⅞	14.8	Burial E-9	323	350911
13, a	4⅞	12.4	6⅞	17.4	Burial 3-B	78	350705
b	4 7/16	11.2	6⅜	16.1	Burial E-21	389	350945
c	4½	11.4	5 13/16	14.8	Burial 9-A	61	350690
d	5⅜	13.5	6 3/16	15.7	Burial west, Group 2, C	242	350858
e	6 3/16	15.6	8¼	20.8	Burial E-12	337	350918
f	7	17.8	8 13/16	22.3	Burial west, Group 2, C	241	350857
14, a	3⅝	9.2	3 3/16	8.0	Burial E-1	301	350887
b	4⅝	11.7	4¼	10.7	Burial E-3	308	350894
c	6¼	15.8	6⅞	17.5	Pueblo, Kiva, C	425	350974
15, a	3 7/16	8.7	2 7/16	6.1	Burial 6-A	38	350671
b	3⅜	8.6	3 3/16	8.0	do	39	350672
c	3⅝	9.1	2⅞	7.3	Burial south of pueblo	253	350863
d	3⅛	7.8	2½	6.3	Child burial, Group 2, C	249	350831
e	4 9/16	11.5	4⅞	12.4	do	247	350850
16, a	7⅜	18.6	5¼	13.3	Burial E-5	312	350898
b	4¼	10.7	9 3/16	23.3	Burial E-4	311	350897
17, a	1¾	4.3	3¾	9.5	Burial 5-B	91	350715
b	3	7.5	5 3/16	13.1	Burial E-8	320	350907
c	3	7.5	6⅛	15.6	Burial 1-A	2	350652
d	2⅜	5.9	5⅛	13.0	Burial 4-B	81	350707
e	3	7.5	7 1/16	18.8	Burial 3-A	24	350663
f	4⅛	10.5	7	17.7	Burial west, Group 2, C	243	350859
18, a	2	5.1	5⅞	14.9	Refuse G-2	144	350759
b	2¼	5.6	5¼	12.8	Burial E-8	317	350904
c	2	5.0	3 7/16	9.8	Burial west, Group 2, C	235	350851
19, a	3⅜	8.6	7 5/16	18.5	Burial E-8	318	350905
b	3⅜	8.5	7	17.7	Burial 4-A	31	350666
c	3 9/16	9.0	7 5/16	18.6	Burial 5-A	37	350670
d	3	7.6	6¾	17.0	Burial south of pueblo	254	350864
e	3¾	9.5	7 5/16	18.6	Burial 9-A	60	350689
f	2⅞	7.2	7⅛	18.0	Burial 8-A	54	350683
20, a	2⅝	6.6	5 5/16	13.4	Burial 1-B	69	350696
b	2⅝	6.7	5⅜	13.5	Burial E-11	333	350915
c	2 5/16	7.4	5 1/16	12.8	Burial 1-C	108	350732
d	2 9/16	6.5	5½	14.0	Child burial, Group 2, C	251	350833
e	2 13/16	7.2	5	12.7	Burial 5-A	36	350669
f	2½	6.2	4⅞	12.4	Burial 1-C	106	350731
21, a	3	7.5	7 1/16	18.8	Burial 3-A	24	350663
b	3⅜	8.5	7½	19.0	Burial E-13	343	350921
c	3 13/16	9.6	7½	19.0	do	347	350924
d	3 7/16	8.7	7 5/16	18.5	Burial 5-B	89	350713
e	3 13/16	9.6	7½	19.0	Burial E-10	325	350913
f	3⅜	8.6	7 11/16	19.5	Burial E-15	354	350926
22 a	3½	8.8	7	17.7	Burial F-2	401	350954
b	3¾	9.4	6 15/16	17.6	Burial 4-C	121	350744
c	3 3/16	8.0	7½	19.0	Burial west, Group 2, C	245	350861
d	3	7.5	7¼	18.4	Burial 6-B	97	350721

TABLE 3.—SIZE AND PROVENIENCE OF OBJECTS ILLUSTRATED IN PLATES—Continued

Plate	Height		Diameter		Provenience	Field No.	National Museum No.
	Inches	Centimeters	Inches	Centimeters			
22, e	4	10.2	7 7/16	18.8	Burial south of pueblo	259	350868
f	3 13/16	9.6	7 3/4	19.7	Burial 7-C	135	350752
23, b	4 5/16	10.6	7 15/16	20.1	Burial 2-B	73	350699
d	3 11/16	9.3	8 1/8	20.6	Burial 4-B	84	350709
a	4	10.2	8 1/4	21.0	Group 1, B	183	350784
c	3 3/8	8.5	8 7/16	21.4	Burial 9-A	62	350691
e	3 9/16	9.0	6 13/16	17.3	Burial E-9	322	350910
f	3 7/16	8.7	6 5/16	16.0	Burial E-1	300	350886
g	3 7/8	9.8	7 1/4	18.4	Burial E-6	315	350902
h	4 1/8	10.5	9 1/4	23.4	Pueblo R-3	424	350973
	Length		Width				
24, a	2 3/8	6.0	2	4.9	Group 1, A	158	350769
b	2 3/8	6.0	1 11/16	4.2	Group 2, C	266e	350835
c	3 7/8	9.7	3	7.6	----do	229a	350829
d	2 5/16	5.5	1 3/8	3.5	----do	229e	350829
e	3 3/8	8.5	2 5/16	5.8	----do	266a	350835
f	2 13/16	7.1	1 7/8	4.8	----do	266b	350835
g	2 3/4	7.0	1 3/16	3.0	----do	229g	350829
h	2 5/16	5.8	2	5.0	----do	266c	350835
i	1 7/8	4.8	1 13/16	4.6	----do	266d	350835
25, a	3 3/8	8.5	1	2.5	----do	267b	350836
b	3 1/4	8.1	7/8	2.2	----do	267a	350836
c	2 3/16	5.4	7/8	2.2	Group 1, A	151g	350762
d	2 3/4	6.9	2 9/32	2.3	Group 4, B	281a	350879
e	2 5/16	6.5	7/8	2.2	Group 1, A	151f	350762
f	3 1/8	7.8	7/8	2.2	Group 1, D	178c	350789
26, a	2 3/4	6.9	1 1/32	0.8	Group 2, C	268e	350836
b	3 5/8	9.2	7/16	1.1	Group 3, A	192a	350804
c	3 15/16	10.0	1/4	0.6	Group 1, B	170	350776
d	3	7.5	35/64	1.3	Group 1, A	151i	350762
e	3 1/8	7.9	3/8	0.9	Burial south, Group 1, B	189b	350803
f	2 7/8	7.3	35/64	1.3	Group 3, A	192b	350804
g	2 1/4	5.7	3/16	0.4	Group 3, C	199	350813
h	2 9/16	6.5	1 1/16	1.7	Group 2, C	268b	350836
27, a	2 1/4	5.6	5/8	1.5	Group 4, B	283b	350881
b	3 3/8	8.6	1 3/16	2.0	----do	283a	350881
c	4 1/16	10.3	1 5/16	3.3	Group 1, A	151a	350762
d	2 1/2	6.2	1 3/8	3.5	----do	154	350765
28, a	6 3/8	16.2	2 1/32	1.6	Group 1, E	182a	350797
b	6 1/8	15.5	2 1/64	0.8	Group 2, A	200a	350814
c	3 1/8	7.8	7/16	1.1	Group 1, B	173	350779
d	3 1/8	7.8	3/8	0.9	E refuse	392	350948
e	2 3/16	5.5	1 3/32	1.0	Group 4, B	284	350882
f	6 3/4	17.2	1 5/32	1.2	Burial south of pueblo	263	350872
29, a	10 1/4	26.0	1 1/16	2.6	Burial E-5	312c	350900
b	8 11/16	22.0	2 9/32	2.3	----do	312e	350900
c	8 3/8	21.2	1 3/16	2.0	----do	312f	350900
d	7	17.8	1 3/16	2.0	----do	312g	350900
e	9 9/16	24.2	7/8	2.2	----do	312d	350900
30, a	4 5/8	11.6	5/8	1.5	Pueblo	412a	350961
b	3 15/16	10.0	3/8	0.9	Burial south of pueblo	264b	350873
c	3 9/16	9.1	9/32	0.7	Pueblo	412d	350961
d	3 13/16	9.7	2 1/32	1.6	----do	412c	350961
e	2 1/4	5.6	1 1/32	0.8	----do	412j	350961
f	2 5/16	5.8	3/8	0.9	Burial south of pueblo	264c	350873

TABLE 3.—SIZE AND PROVENIENCE OF OBJECTS ILLUSTRATED IN PLATES—Continued

Plate	Length		Width		Provenience	Field No.	National Museum No.
	Inches	Centimeters	Inches	Centimeters			
30, g	2⅝	6.6	1 1/32	0.8	Pueblo	412h	350961
h	2 13/16	7.1	9/32	0.7	do	412g	350961
31, a	5½	14.0	1 1/16	2.6	Burial E–2	307a	350893
b	4⅜	11.1	2 9/32	2.3	Burial E–5	312b	350900
c	6 7/16	16.3	1 3/16	2.0	Pueblo R–43	411	350960
32, a	22	55.88	[1] 12 [2] 8	30.48 20.32	Group 4, A		
33, a	5⅛	13.0	3⅞	9.7	Group 3, C	488	350998
b	6⅛	15.6	3¾	9.5	Group 1, B	473	350783
c	4¾	12.1	3 7/16	8.7	Group 1, D	476	350794
d	4⅜	11.1	3 15/16	10.0	Group 1, C	474	350787
e	4⅝	11.8	4 1/16	10.3	E refuse	489b	350993
f	5⅞	14.8	3⅞	9.7	Group 1, B	472	350782
	Height		Diameter				
34, a	1¾	4.4	2 9/16	6.5	Group 1, C	191	350786
b	2½	6.3	5 3/16	13.1	Group 3, B	198	350808
c	3⅛	7.9	4⅝	11.6	Group 2, C	226a	350827
d	2½	6.4	5⅞	14.8	Group 1, D	180x	350792
e	2 5/16	5.8	4 1/16	10.3	Group 1, C	169x	350785
	Length		Width				
35, a	11 3/16	28.4	5	12.6	Burial E–5	312a	350899
b	6 5/16	16.0	1⅜	3.5	Group 2, C	273	350841
c	2½	6.3	2¼	5.6	Burial 6–C	132	350750
d	7 13/16	19.8	4 9/16	11.5	Group 1, C	491a	351000
36, a	2	5.0	1 3/16	2.0	E refuse	394	350950
b	1⅞	4.8	1 3/16	2.0	do	461	350987
c	2⅜	6.0	1	2.5	B refuse	104	350728
d	3¼	8.2	1½	3.8	A refuse	21	350660
e	2 1/16	5.2	3 1/32	2.4	E refuse	390a	350946
f	2⅝	6.6	1⅛	2.9	Group 2, C	226c	350828
37, a	2 7/16	6.1	1⅛	2.9	Pueblo	418b	350968
b	2¾	7.0	1⅜	3.5	do	419b	350969
c	2⅝	6.7	1	2.5	do	418a	350968
d	3	7.5	1 9/16	3.9	do	419a	350969
38, a	2½	6.4	1 1/16	1.7	Group 2, C	272a	350840
b	2 5/16	5.8	1 3/16	2.0	Group 4, B	287	350885
c	2 1/16	5.4	⅞	2.2	Burial 1–C	114a	350738
d	2 1/16	5.2	1 3/16	2.0	Group 2, C	272b	350840
e	2	5.0	1 1/16	1.7	E refuse	460a	350986
f	2 3/16	5.5	2 1/32	1.6	do	390g	350946
g	3¾	9.5	2 3/32	1.8	Refuse near Group 2	278	350875
39, a	6 1/64	2.4	1 9/32	1.5	A refuse	11	350654
b	1⅛	2.8	9/16	1.4	do	11	350654
c	1 1/16	2.6	9/16	1.4	Group 3, B	239	350812
d	1⅝	4.0	1 1/16	1.7	E refuse	460b	350986
e	1 7/16	3.6	2 7/32	2.1	do	460c	350986
f	17/32	2.1	1 3/32	1.0	G refuse	455a	350981
g	1⅝	4.0	5/8	1.5	Pueblo	418g	350968
h	1 1 1/16	4.2	1 3/16	2.0	do	418d	350968
i	1⅜	3.4	¾	1.9	do	418h	350968

[1] Bottom. [2] Top.

TABLE 3.—SIZE AND PROVENIENCE OF OBJECTS ILLUSTRATED IN PLATES—Continued

Plate	Length		Width		Provenience	Field No.	National Museum No.
	Inches	Centimeters	Inches	Centimeters			
39, j	1 3/16	3.0	2 3/32	1.8	Pueblo	418m	350968
k	1 5/16	2.3	1 7/32	1.3	do	418l	350968
l	1 1/16	2.6	2 1/32	1.6	do	418k	350968
m	1 3/16	3.0	5/8	1.5	do	418i	350968
n	1 1/2	3.8	9/16	1.4	do	418f	350968
40, a	1 5/8	4.0	3 7/8	9.8	Group 1, D	190	350793
b	1 1/8	2.7	2	5.0	Group 1, A	155	350766
c	1 3/16	3.0	1 3/4	4.3	Group 1, D	179	350790
d	3 1/32	2.4	1 7/8	4.7	Group 2, C	274	350842
e	1 1/8	2.8	2 3/8	5.9	Burial 6-C	131	350749
41, a	1 3/16	2.0	2 9/32	2.3	Burial 3-B	74	350700
b	1 1/8	2.7	1 3/16	2.0	Burial 6-B	100	350724
c	1 3/32	1.0	1 1/32	0.8	A refuse	18	350657
d	1 3/4	4.5	1 1/8	2.8	Group 1, B	165	350775
e	1/2	1.2	5/16	0.7	E refuse	464	350989
f	3/8	0.9	1/4	0.6	Burial 5-B	95	350719
g					do	95	350719
h					do	95	350719
i					do	95	350719
42, a	1 5/8	4.1	4 3/64	1.7	do	94	350718
b	1 7/8	4.7	2 3/32	1.8	do	94	350718
c	1 3/16	2.0	7/16	1.1	G refuse	450	350977
d	1 1/16	2.7	3 3/64	1.3	do	450	350977
e	1 1/4	3.1	5 1/64	2.0	Burial 6-B	101	350725
f	5/16	3.3	5/8	1.6	Surface east, Group 1, B	164	350774
g	1 7/16	3.6	1 3/32	1.0	Burial 6-B	102	350726
h	2 1/4	5.7	9/16	1.4	Group 1, A	152	350763
43, a					Burial 8-A	57	350686
b					do	56	350685
44, a					Burial E-2	305	350890
45, a					do	307	350892
	Through valve						
46, a	2 1/4	5.6	2 1/4	5.6	Burial 6-B	99a	350723
b	2 3/4	7.0	2 3/4	7.0	Burial 9-A	59d	350688
c	2 3/4	7.0	2 3/4	7.0	do	59b	350688
d	2 1/8	5.3	2 1/8	5.3	Burial 6-B	99b	350723
e	2 1/8	5.3	2 1/4	5.6	do	99c	350723
f	2 3/4	7.0	2 7/8	7.2	Burial 9-A	59c	350688

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INDEX

Page

Acknowledgments 1
Adobe structures—
conclusions drawn from 111
construction of walls of 92–93
reinforced by poles 87
remains of 59
theory concerning 89–90
Agriculture, beginnings of, among the Basket Makers 2
Alona, site of present Zuñi 10
Alterations in rooms 103
Appliqué of figures on pottery 123
Apron to ventilator 25, 30, 39, 53
Archeological evidence—
for movements of people 9
in contrast with myths and legends 9–10
Archeology, southwestern, present status of, reviewed 2–5
Armlets, of carved shell 162
Arrowheads, period characteristics of 159
Artifacts—
conclusions drawn from 168
found in holes in floor 74
found in storage hole 38
perishable and imperishable 113–114
size and provenience of 178–182
two periods represented by 163–168
variations in, summarized. 174
Atlatl, use of 159
Aubry, F. X., route followed by 12
Awls, bone—
from pit houses 150–152
from pueblo 152–153
Ax heads—
grooved 156
materials used for 156
two forms of 155–156
Aztec Ruin— Page
possible identification of, in Zuñi legend 9
reference to 107
reference to pottery from 123, 146
Band designs described 138–141, 144, 145
Bandelier, A. F., mention of 14
Banding on necks of jars 116, 121
Bands, decoration in form of 131
Barth, Sol, town started by 14
Basket Maker culture, divisions of 2–3
Basketry, pueblo, finer than pit-house 150, 166
Beads—
8-shaped 161
flat circular 161
made of bone 153
of olivella shell 160–161
Beale, E. F., route followed by 13
Beckwith, Lieutenant, reconnaissance made by 12
Bench—
encircling pit house 20
raised, discussion of 78–80
unusual feature of 78
See also Platform.
Binder, in pottery, materials used as 115–116
Bird-shaped vessels 127
Black interior wares, classes of 117–118
Black-on-red ware, designs of 146–147
Black-on-white ware—
designs on 145–146
variations in 117
Blades, stone 158
Bone—
implements of 150–153
ornaments of 153
Bonework, period differences in 166

Page

Bow and arrow, period of first use 3
Bowls—
decoration of, described 133–141
distinguishing features of 128–129
finish on 129
forms of 128
pattern of decoration on 130–131
red, with white designs 118
rims of, painted 131
stone, found in pit houses 156
stone, method of manufacture 156–157
Bracelets—
number worn 162
of glycymeris shell 162, 163
Bradfield, Wesley, reference to work of 109, 162
Burials—
beads found in 161
conclusions drawn from 168–171
description of, summarized 174
found in ventilator 23–24
in graves 58
in oval pit 65
in refuse mounds 42, 43, 58, 170
in storage pits 41–42, 77
near hearth, theory concerning 58
of children, discussed 58, 170
of portions of a body 169–170
ornaments found in 162
pit-house, not oriented 168
places used for 19
position of body in 168–169
pueblo, all oriented 170
with stone slab 157
Caliche, as an indication of time 66–67
California emigrants, route followed by 12
Camels, experimental use of 13
Campbell, Richard, route taken by 12
Canteens—
decorations on 145, 147
distinctive features of 126
Cardenas, mention of 10
Carving, in shell 160, 162
Cedar, used for posts 25
Ceremonial chamber—
development of 172
See also Kiva.

Chaco Canyon— Page
reference to pottery of 123, 124, 133, 136, 138, 139, 143, 145, 146, 148, 165.
reference to work in 162
wainscoting in kivas of 51
Chaco Canyon ruins—
identification of, in Zuñi legend 8–9
reference to 106, 107
Chaco cultures, affiliations of 9
Children, burial of, near hearth 58
Chronology—
evidence of 78
southwestern, dates of 4–5
Cibola, mention of discovery of 10
Clans, grouped in clusters 110
Cliff Palace, reference to 107
Cloud-blowers—
clay 149
See also Pipes.
Coiled ware, development of 115
Collier, James, route taken by 12
Communal house—
growth of 90–91
remains of 90–109
See also Pueblo ruin.
Compartments—
and ridges, discussed 29
used for storage 97
Corn—
burned in granary 58
carbonized, found in pit 41
effect of introduction of 2
Corn pollen, the sacred meal of the Zuñi 6
Coronado Expedition, country traversed by 10
Corrugated ware—
indented 122–123
period of 116
with incised decorations 123
Cranial deformation, adoption of 3
Culture—
Pueblo, decline of 4
southwestern, development of 2–5
Culture periods, duration of 4–5
Culture stages, gap in 113
Cummings, B. S., reference to work of 17, 110
Cushing, F. H., reference to work of 8

Page

DATES, in southwestern chronology 4–5
DAVIS, JEFFERSON, mention of 13
DECORATION—
by use of appliqué figures 123
elements used in 130
in band form 131
of pottery, discussed 117–119
place of, on pottery 130
See also DESIGNS; ORNAMENTS.
DEFLECTOR—
good example of 30
made of stone slab 55
use of 18
DEPRESSIONS—
for ladder 17
of unknown use 55
rectangular, purpose of, unknown 30
used for pot rests 18
See also FIRE PIT; HOLES; LADDER BOX; PITS; STORAGE PITS.
DESIGNS—
balanced 136
band, described 138–141
bisected 132
derived from textile patterns 141
in bottom of bowls 140–142
negative 137, 138
on ladles 142–144
on pottery 130–149
pendent from rim 135–138
period differences in 165–166
quartered style of 133–135
spiral 137
tripartite 135
DIPPERS, forms of 129
DISKS, clay 149
DOORWAYS—
communicating, between rooms 96
exterior 106
exterior, lack of 96–97
series of 104–106
DOUGLASS, A. E., reference to work of 4
DRILLS, stone 158

DWELLINGS— Page
evolved from storage bins 3
gap in development of 113
hiatus between types of 174
hundred-roomed 4
improvement in 3
order of development of 109
sequence of types of 89–90
subterranean, examples of 109–110
See also JACAL STRUCTURES; PIT HOUSES; PUEBLO RUIN.
ELDEN PUEBLO, reference to work at 162
ELEMENTS, used in design 138
ENTRANCE, through roof 16–17, 106
ESPEJO, visit of, to Hopi towns 10
ESTEVANICO, mention of 10
EXCAVATIONS, extent of 171–172
FAMILY CIRCLE, regard for 58
FAMILY UNITS, in groups 19
FARFÁN, explorations of 11
FEWKES, J. W., reference to work of 123, 160, 162
FIRE—
bodies consumed by 36
houses destroyed by 35
FIRE PITS—
described 33
extension of rim of 26–27
exterior 42, 57, 77, 107–108
in kiva 97
location of 17
with plaster rim 20, 38, 52, 55
FIRING OF POTTERY, color affected by 117, 119
FORMS OF POTTERY 120–122
"FUGITIVE RED" WARE, from pit houses 120
FURNISHINGS. *See* PIT HOUSES, interior features of; KIVAS, interior features of.
GILA RIVER, UPPER—
carved shell from 162
reference to pottery from 123, 133, 146, 165
GLAZED WARE—
application of the term 118
development of 118
GLYCYMERIS SHELLS—
bracelets of 162
pendants made of 160

	Page
Goodwin, John M., mention of	13
Granaries—	
construction of	41
described	3
structure possibly used as	65
Habitations. *See* Dwellings; Jacal structures; Pit houses; Pueblo ruin.	
Handles—	
decoration on	148
on jars	121
on pottery	126
pitcher, type of	128
tubular	129
Hantlipinkia, location of	8
Hard Scrabble, identification of ruins at	7
Haury, E. W., reference to	110
Hawikuh—	
Coronado expedition at	10
reference to pottery from	146
Head deformation. *See* Cranial deformation.	
Holes in floor—	
aligned and graded	80
possible use of	38
possibly used for loom posts	29
similar to sipapu	17, 21
used as pot rests	74
used for storage	21, 38
See also Depressions; Pits.	
Holmes, W. H., reference to work of	123
Hopi custom	94
Hopi kivas, reference to	107
Hopi pottery, reference to	123
Hopi villages, visited by explorers	10
Hough, Walter, mention of work of	14, 109, 123, 155, 156
House A, group 1	20–25
House A, group 2	43–45
House A, group 3	59–61
House B, group 1	25–32
House B, group 2	45–48
House B, group 3	61–64
House B, group 4	78–82
House C, group 1	32–37
House C, group 2	48–54
House C, group 3	64–65
House C, group 4	82
House D, group 1	37–40
House D, group 2	55–57
House D, group 3	65–72
House E, group 2	57
House E, group 3	72–76
House groups, detailed description of	19–86
Houses. *See* Dwellings; Jacal structures; Pit houses; Pueblo ruin.	
Howe, C. O., land acquired by	14
Hustito, information furnished by	6
Implements—	
chipped, material used for	158
of bone	150–153
of chipped stone	157–159
period differences in	166–167
Interior furnishings. *See* Houses, interior features of.	
Jacal structures—	
built above ground	87
conclusions drawn from	111, 173
contemporaneous with pit houses	88–89
disappointing remains of	16
evidence of, before excavating	15
method of construction	87–88
remains of	59, 86–90
variations of	88
Jacob's Well, described	13
Jars—	
globular	125
ovoid	124
with banded necks	116
See also Canteens; Water jars.	
Jeancon, Jean Allard, assistance rendered by	1
Judd, N. M., reference to work of	17, 124
Kayenta pottery, reference to	135, 165
Kiatuthlanna—	
meaning of the name	1, 6
object of work at	2
Kidder, A. V., mention of work of	15, 67
Kidder and Guernsey, reference to work of	17, 123, 162
Kiva stone—	
found in sipapu	52
object called	157

KIVAS— Page
construction of 106
description of 93–95
D-shaped, described 97
Hopi, reference to 107
interior features of 93–94, 100, 106–107
method of construction of 100
possible prototype of 111
two types of 113
unique feature of 98
with wainscoting 51
KNIFE BLADES, STONE 158
LADDER BOX—
described 33
development of 21
identification of 20
indicating double-poled ladder 62
with rim 20, 38
LADDERS—
development of 33–34
embedded in floor 46
of notched poles 38
position of 21
runged, evidence of 55
theories concerning 74
types of 33, 34
use of 17
LADLES—
decorations on 142–144
forms of 129
ornamentation of 147
LEGENDS. *See* MIGRATION LEGEND; MYTHS AND LEGENDS.
LINCOLN, PRESIDENT, mention of 13
LINE BREAK, in pottery painting, explained 131
LINES, INCISED, on culinary vessels 122
LITTLE COLORADO, UPPER, reference to pottery of 146
LONG H RANCH—
archeological investigations on 1, 14–15
brief history of 14
origin of the name 14
pioneering parties near 12
region of, described 5
settlement of region of 14
Spanish explorations near 10
LOOM, indications of 29–30
LUNA, N. MEX., reference to pottery from 127, 139
McCABE, B. C., acknowledgment to Page 1
MANOS—
described 155
graded series of 47
MARCOS OF NIZA, FRIAR, journey of 10
MASONRY—
discussion of adoption of 98–100
See also WALLS.
MATERIAL CULTURE—
conclusion drawn from 175
relations indicated by 168
See also BASKET MAKER CULTURE; PUEBLO CULTURE.
MAULS, two forms of 155
MEASUREMENTS—
of House A, group 1 24–25
of House A, group 2 45
of House A, group 3 61
of House B, group 1 31–32
of House B, group 2 48
of House B, group 3 63–64
of House B, group 4 81–82
of House C, group 1 36–37
of House C, group 2 53–54
of House C, group 3 65
of House C, group 4 82
of House D, group 1 39–40
of House D, group 2 56–57
of House D, group 3 71–72
of House E, group 2 57
of House E, group 3 75–77
of isolated houses 84–85, 86
tables of 177–182
MESA VERDE POTTERY, reference to 123, 146, 165
METATES—
described 47, 154
placing of 18
series of, with mealing bins 47
worn-out, use of 77
MIGRATION LEGEND of the Zuñi 6, 7–8
MILLING STONE. *See* METATE.
MIMBRES VALLEY—
carved shell found in 162
reference to pottery of 133, 165
MINDELEFF, VICTOR, reference to 95
MOOREHEAD, W. K., reference to work of 162
MORRIS, E. H., reference to work of 9, 17, 123

Page

MORTUARY CUSTOMS. *See* BURIALS; MORTUARY OFFERINGS.
MORTUARY OFFERINGS—
in pit-house graves 169
in pueblo burials 170
MYTHS AND LEGENDS, unreliability of 9–10
NAVAHO SPRINGS—
ruins near, recorded by Whipple 13
temporary capital of Arizona Territory 13
NAVAHO SWEAT HOUSES, construction of 41
NICHE, purpose of, unknown 64
NORDENSKIÖLD, reference to work of 123
NUBBINS, on pitcher forms 126
OÑATE at Zuñi 11
ORIENTATION—
in pueblo burials 170
lacking in pit-house burials 168
ORNAMENTATION. *See* CARVING; DECORATION; DESIGNS; ORNAMENTS.
ORNAMENTS—
of bone 153
of shell 160–163
of turquoise 159
PALETTE, of stone 157
PASTE, USED IN POTTERY, composition of 115, 119
PENDANTS—
of abalone shell 160
stone 159–160
PENDENT FIGURES, negative design formed by 137, 138
PETRIFIED FOREST, stone used from 5
PETRIFIED WOOD, described 5
PILASTERS, roof supported by 97
PIPES—
clay, tubular or conical 149
stone 150
stone, tubular 159
PIT HOUSES—
abandoned, burials in 19
approaching rectangular shape 32
completely covered by refuse mound 77
connected by opening 64
construction of 16–17, 26–29, 46, 59
PIT HOUSES—Continued.
described 16–86
destroyed by fire 35, 45, 49
discovery of remains of 15–16
double-roomed, possibility of 26
grouping of 19, 110, 172
interior features of 17, 43–45, 46, 59–61, 62–63, 64–65, 67–69, 74–75, 84, 85, 86.
interior features of, summarized 110, 172
isolated 83–86
kinds of, summarized 172, 173
measurements of 24, 31, 36, 39, 45, 48, 53, 56, 57, 61, 63, 65, 71, 75, 81, 82, 84, 86.
of unusual form 64
overlapping portions of 19–20
position of 43
progression in types of 89–90
size of 16
slab-lined, compartment in 27–29
structural variation of 48
superstructure of 110
time spent in 42
types of, uncovered 15, 109
types similar to 17
under pueblo ruin 85
unit or single clan 4
with shallow pit 86
PIT-HOUSE POTTERY, distinctive feature of 126
PITCHERS—
bird-shaped 127
black-on-red ware 128
decorations on 145, 147–148
described 126–128
double 127
shapes of 121–122
PITKIAIAKWI, remains of 7
PITS—
rectangular, of unknown use 98
theories concerning 57
See also DEPRESSIONS; FIRE PIT; HOLES; LADDER BOX; STORAGE PITS.
PLASTER—
annual coats of, in kiva 94
composition of 16
time reckoned by 94, 107
PLATFORM—
raised, discussion of 67
spectator's, use of 107

Page
POLYCHROME WARES, development of 118
POSTS—
partially incorporated in walls 32
remains of 20, 25, 37
slanting 83
POTTERY—
classification of 116
coiled 115
color of, affected by firing 117, 119
corrugated 116
corrugated, development of 4
culinary, classes of 117
culinary, forms of 120–121
decorated, classes of 117
decorated, first appearance of 3
development of 3, 114
discussion of 114–149
forms of 120–130
materials used in 115–116, 119
miscellaneous objects of 149–150
nonculinary, characteristics of 117
period differences in 163
pit-house forms of 164
pueblo, characteristics of 166
pueblo, different from pit-house 127
pueblo forms of 164
Pueblo I, two phases of 165
specialized 4
surface finish of 119–120, 163–164
treatment of surface of 116
unfired, method of making 114–115
variation in 119
varieties of paste used in 163
PRAYER FEATHERS, at the lakes 7
PROTO-KAYENTA WARE, reference to 135
PRUDDEN, T. M., reference to 107
PUEBLO BONITO, reference to work at 162
PUEBLO CULTURE, divisions of 3–5
PUEBLO PEOPLES—
arrival of 3
concentration of 4
cultural decline of 4
PUEBLO POTTERY—
decorations on 145–149
distinctive feature of 126
PUEBLO RUIN— Page
abandonment of rooms in 100–101
built in units 91, 91, 95, 98, 102, 111–112
clearing of 15
conclusions drawn from 111–113, 173–174
described 90–109
different grades of construction in 95
one story in height 108
parts of, destroyed by fire 103
position of, in Little Colorado chronology 108
remains under 93
stages in development of 91–107
stages in growth of 90–91, 111–112
suggestive of San Juan type 108
RECESSES—
for storage 18, 38–39
in kiva, discussed 107
in wall, use of 21–23
of unusual form 72–73, 75
RED LAKE, ceremony at 7
RED WARE, decorated in black 118
REFUSE, deposits of, in rooms 23
REFUSE MOUNDS—
burials in 43, 58, 109
described 42–43, 77, 82
near houses 19
RIM, PLASTER, extension of, from fire pit 26–27
RIMS OF BOWLS, break in painting of 131
RINGS, of bone 153
ROBERTS, LINDA B., assistance rendered by 1
ROOF—
built from ground level 49
construction of 49
form of, over recess 73–74
ROOMS—
alterations made in 103
ceremonial, sequence of 113
communicating 104–106
of pueblo described 93
on different levels 103–104
table of measurements of 177–178
used as refuse pits 23, 102, 103
RUINS—
location of 15

Page

RUINS—Continued.
measurements of 36–37, 39–40, 45, 48, 53–54, 56–57, 57, 61, 63–64, 65, 71–72, 75–77, 81–82, 82, 84–85.
SACRED LAKE—
location of 6
pilgrimage to 7
ST. JOHNS—
mention of 5
settlement of 14
SAN JUAN AREA, reference to pottery of 133, 136, 146, 165
SAUNDERS, ART, acknowledgment to 1
SCRAPERS—
bone, from pueblo 152–153
pottery, from pit house 149
SCREEN, WATTLE, indication of, between rooms 26, 32
SEED JARS—
absent in pueblo ruin 147
decorations on 144
double-lobed 125
period of, indicated by lip 125
shapes of 125
with single loop handle 125
SHELL, objects of 160–163
SHELL ORNAMENTS, period differences in 167
SIPAPU—
absence of, discussed 94–95
an indication of ceremonial use 95, 97
holes similar to 17, 29
location of 46
object found in 52
three in one house 80
SITGREAVES, CAPTAIN, route followed by 12
SKELETAL REMAINS—
conclusions drawn from 174–175
significance of 171
See also SKULLS.
SKULLS, change indicated by 3
SLAB-LINED PIT HOUSES, absence of 16
SLIP—
development of 116
present in pueblo ware 120
red, adoption of 118
SPANISH EXPLORATIONS 10–11

Page

SPEAR POINTS, described 153
SPIER, L., reference to work of 14–15, 130
SPRUCE TREE HOUSE, reference to 107
STEVENSON, MRS. M. C., reference to work of 6, 7, 8
STONE OBJECTS—
described 153–160
of unknown use 157
STONE SLABS—
in burials 157
not used in pit houses 16
STONEWORK—
methods used in 153, 155, 166
period differences in 166–167
See also WALLS, STONE; MASONRY.
STORAGE—
compartments used for 97
depression used for 52
recesses for 18, 38–39, 72–73, 75
STORAGE PITS—
artifacts found in 38
burials in 19, 41–42, 77
described 47, 58
outdoor 76–77
remains of 40–41
STRATIGRAPHY, examples of 66, 78
SUPERPOSITION—
of refuse over houses 77–78
of structure over room 66
TANQUE VERDE, reference to structures of 110
TEMPERING, materials used for 119
THORN, CAPTAIN, mention of 12
TIMBERS, length of, for building 32–33
TOVAR, mention of 10
TRADE, evidence of, in shell 163
TSA'WEHLE, information furnished by 6
TUCKER LIVESTOCK CO., reference to 1
TURQUOISE—
offerings of 6
ornaments of 159
TWIN SALT LAKES—
ceremonies connected with 6–7
described 6
explorations near 11–12
investigations at 1, 5
legend of 6

Twin Salt Lakes—Continued. Page
location of 5
not mentioned by Spaniards 10
Ventilator—
bell-shaped 70
construction of 23, 30, 80–81
described 18, 23, 34–35, 47, 53, 62
effectiveness of 38
elaborately constructed 30
of kiva, described 94, 98
plastered, described 59–61
skeleton found in 70–71
unusual opening of 56
used as entrance 70
Ventilator shaft, cover provided for 53
Ventilator tunnel, unusual feature of 63
Village, composition of 110–111
Wainscoting—
covered 51
in kivas, possible explanation of 51–52
in pit house, explanation of 51
Walls— Page
adobe, veneered with stone 100, 112
flattened at ventilator 23, 25
of pit house, reenforcement of 51
of pueblo described 92–93
possible construction of 73
recesses in 18, 21–23, 38–39, 72–73
sloping 20
stone, adoption of 98
stone, use of, in kiva 97
veneered, explanation of 104
Water jars, scarcity of 124
Watercress Place—
location of 7
Zuñi name for 7
Wattle screen, between rooms 26, 32
Weapons of the Basket Makers 3
Whipple, mention of 12
Winter People, mythical migrations of 8
Zuñi Indians—
migration legend of 6, 7–8
mythical division of 8

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